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"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because peace is enervating and no man is wise enough to foretell when soldiers may be in demand again." (GENERAL SHERMAN.)

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XUM

THE IMPORTANT IMPROVEMENTS IN THE ART OF WAR DURING THE PAST TWENTY YEARS AND THEIR PROBABLE EFFECT ON FUTURE MILITARY OPERATIONS.*

BY CAPTAIN FRANCIS VINTON GREENE,
CORPS OF ENGINEERS, U. S. A.

THE Council has fixed the date for the delivery of the essays at March 1st, 1882, and twenty years from that date carries us back to the Spring of 1862.

At that time the great Civil War was in progress in this country, and in the ensuing years three great wars have been fought in Europe, viz.: between Prussia and Austria in 1866, between Germany and France in 1870, and between Russia and Turkey in 1877. The lessons of these four wars, and the results of the studies and inventions of military men in the intervals between them, are therefore the subjects to be considered in this essay. The subject is so comprehensive that the limit of sixty pages affords space for general conclusions only and not for details.

The science and art of war (on land) may, roughly speaking, be divided into three great branches, as follows:[1]

First.—The organization of armies.

Second.—The moving of armies and bringing them to the battle-field, or *Strategy*.

Third.—The fighting of armies in battle, or *Tactics*.

It is doubtful if any period of the world's history affords so many important changes in each of these branches as the two decades just closed.

* This Essay was reported by the Board of Award, of which General George B. McClellan was Chairman, as "of about equal merit in its treatment of the general subject" with the Prize Essay for 1882 (Lazelle's), and as deserving of first "HONORABLE MENTION."

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FIRST.—THE ORGANIZATION OF ARMIES.

The change effected during the present generation in the manner of organizing armed forces has been of a fundamental character. The wars of Frederick and Napoleon were fought with fixed standing armies, whose numbers did not vary in peace or war, whose soldiers were enlisted for half a life time, and whose losses were replaced by raw recruits, either merged into the depleted regiments or formed into new regiments. The wars of to-day in Europe are fought by armies, only a small portion (about one-third) of whose numbers are kept in active service in time of peace, whose soldiers serve in the ranks but a short time, and whose losses are replaced by trained soldiers.

The origin of the modern system is found in the humiliating conditions imposed on Prussia by Napoleon after the battle of Jena;[3] the system was elaborated in fifty years of constant thought and experiment in Prussia; it was brought into action with brilliant success by that Power in two great wars; and it has now been adopted by every one of the Continental Powers.

Its essential principles are as follows:

First.—Universal liability to military service during a certain period beginning at twenty years of age.

Second.—The selection annually by lot, from among all men attaining that age, of those who are to serve in the ranks and those who are to be held in reserve.

Third.— The division of the term of service into certain periods, the first of which is passed in the ranks, the second on furlough liable to instant call, the third in the reserve on a more permanent furlough liable to call after the above class is exhausted.

Fourth.—The formation of depots where a portion of the reserves are collected as Ersatz, or feeders, to replace losses constantly occurring in the field, and thus keep the regiments up to their full strength.

Fifth.—The formation of a portion of the reserves into secondary (landwehr) regiments or armies for service in rear of the army at the front.

Sixth.—The mobilization at the outbreak of war, *i. e.*, the transformation of the army from a peace footing to a war footing, effected by summoning the men on furlough to rejoin their regiments, collecting the feeders at the depots, and calling out so much of the landwehr as may be necessary.

These general principles have been adopted by Germany, France, Russia, Austria, Italy and some of the minor Continental Powers. In Germany the total length of service is twelve years; three years in the ranks, four years in the reserve and five years in the landwehr. In other States the length and nature of the service vary, and there are many

minor differences in the details in each State which cannot be stated here. A few of them are given in the appendix.[3]

The great purpose accomplished by this system of expansive armies is this: it enables a State to put into the field in the short space of two weeks a vast horde of trained soldiers, while in time of peace it maintains only a comparatively small portion of them, under pay and unproductive.

But though relatively small the number is absolutely very great, being very nearly one in ten of all able-bodied men, or something over 3,000,000 for Continental Europe. The necessity for this terrible drain upon the resources of a population is found in the conditions of modern civilization; facility of transportation by the agency of steam has made it possible to subsist enormous bodies of men and to move them over large distances in a very short space of time. Any State therefore which is separated from a powerful neighbor only by a boundary presenting no physical obstacle to travel must be prepared to defend itself at a moment's notice, or it will cease to exist. For such States the above principles are of universal application, as they form the best means of defence which have yet been devised.

Among the great nations of the civilized world two only are not subject to this condition, since only two have boundaries which cannot easily be crossed. England is divided from her nearest neighbor by a stormy channel, and the United States are separated from every powerful State by a broad ocean. In England, therefore, the above principles have received but a partial application, and in this country they have not been applied at all.

It was but two weeks after the declaration of war in 1870 when nearly half a million German soldiers advanced in a body across the frontier of France. This is the measure of time that the Continental Powers can count upon to be ready for defence. By no possible means now known can so large a force be moved in a body at sea. England can therefore count upon a comparatively long period in which to prepare for attack on her shores. Consequently she maintains an army at home of only 100,000 men, and the expansive principle has been introduced into it only to a limited extent. Voluntary enlistments are still retained in place of universal liability to service; but the recruit is allowed to choose between "long service" and "short service," the former being for the full term of twelve years in the ranks, and the latter being for six years in the ranks and six years on furlough. This principle was introduced in 1870, but to what extent it will prove available in creating a reserve of trained men cannot now be stated. In 1878, in anticipation with a war with Russia, the reserves were called out, but there proved to be only 8,000 of them available.[4] At the end of three months only two corps, each of 35,000 men, were in readiness for foreign service, with a third corps promised

for the next month, making about 100,000 men in all; and this seemed to be the limit of offensive strength in an army numbering 190,000 men in ordinary times, of whom about half were serving at home. Evidently the expansive principle has here received but a slight application. Ultimately, however, this system is calculated to afford a reserve of 60,000 men.

In addition to these, England relies upon the services of the Militia and the Volunteers, but both of these bodies possess the vital defect of never having had the experience of regular training.

The immunity from sudden attack in this country is apparently so complete that we have never maintained anything but a small army, with highly trained officers, and in war have trusted to raising large armies and training them as the war progressed. With so small a force the expansive principle by short service, reserves, etc., seems hardly applicable; for even were the army capable of expansion to treble its ordinary strength, the result would be but a bagatelle for a great war.

What, then, has been the result of the organization of armies upon the course of the four great wars just cited?

The Civil War in America lasted four years. Statistics on the Southern side are not available, but the valuable paper of General Vincent read before this Institution[5] shows the progress of the Northern armies.

The regular army in January, 1861, numbered 16,402 officers and men, scattered over a continent. In October, 1861, there were in the field, equipped and ready for service, 250,000 men, viz.: 145,000 in the Army of the Potomac, 80,000 in the Western Department and 25,000 in the Department of the Cumberland.

In the succeeding years the number of men in active service was, in round numbers, as follows:

January 1st, 1862,	550,000
January 1st, 1863,	890,000
January 1st, 1864,	836,000
January 1st, 1865,	937,000
May 1st, 1865,	1,034,000

That is to say, during the last two years of the war an army of about 900,000 men was maintained in actual service in spite of losses. Up to May, 1865, 2,679,000 men had been enlisted (or reduced to a three years' standard, 2,228,000). Of this number 281,000 were killed or died of wounds, 1,034,000 were in service at the close of the war, probably 600,000 were incapacitated by wounds, and 300,000 had been discharged by expiration of service, or were prisoners in the hands of the enemy, or had deserted. The extraordinary duration of the war may be traced directly to the lack of preparation and organization. Had either or both

sides been prepared, and provided with a well organized army, the war must have closed in two years. As in the course of a century, however, we have had but one war calling for the employment of as many as 100,000 men in the field, it can readily be shown that our system of a very small and inexpensive army and a very costly war is much cheaper in the long run than a constantly expensive army and a comparatively less expensive war. For if we spend $25,000,000 a year on our present army for one hundred years and $3,500,000,000 for a war, the total is $6,000,000,000 in one hundred years; whereas if we maintained a force costing, like those of Germany and France, $100,000,000 a year, and had a war costing $2,000,000,000, the total would be $12,000,000,000—a clear saving for us of $6,000,000,000 in money, to say nothing of saving the immense loss caused by withdrawing such a large number of men from productive employment.

The infrequency of our wars, as judged by the past, is ample warrant for our present system. This does not, however, justify the very serious defect of the recruiting system of the late war, which consisted in raising new regiments of raw recruits and inexperienced officers instead of filling up the old regiments.

Of the million of men in arms at the close of the war the proportions were nearly as follows:

870,000 infantry,
87,000 cavalry,
43,000 light artillery.

Which, if the regiments had been full, would have given

870 regiments, or 870 battalions of infantry.
87 regiments, or 435 squadrons of cavalry.
24 regiments, or 288 batteries of light artillery.

Yet, from General Vincent's statistics, we find that there were raised and mustered between 1861 and 1865:

1,668 regiments,
21 battalions,
504 companies,
} or 1,740 battalions of infantry.

232 regiments,
9 battalions,
122 companies,
} or 1,248 squadrons of cavalry.

8 regiments,
5 battalions,
244 companies,
} or 350 batteries of light artillery.

In other words, there were twice as many regiments of infantry and nearly three times as many squadrons of cavalry as there should have been. There is no doubt that certain local causes prevailed to prevent the best use being made of the raw material in men.

Of the 900,000 men maintained during the last two years of the war,

from 600,000 to 670,000 were actually in the field, the rest being employed in garrison duty, guarding communications, etc.[6]

At the outbreak of the war of 1866 the Prussian Army in active service numbered 210,000 men.[7] Mobilization was ordered on May 3d, and six weeks later the active army had been increased to 326,000 men, in addition to depot and garrison troops, whose numbers, it is stated, carried the total to 600,000 men under arms. Of these not less than 230,000 were brought to the field of Sadowa on July 3d, and there inflicted such an overwhelming defeat on the Austrians as to cause them to sue for peace at once. The war lasted less than three months, only six weeks of which were devoted to active operations.

In 1870 the armies of the States composing the present German Empire numbered in all 382,568 men[8] present with the colors. The order for mobilization was given on July 15th, and two weeks later there were concentrated on the Rhine three armies, numbering 440,000 men. On August 15th the effective total of men under arms was 1,183,389, of whom 650,000 were at the front, 230,000 in the depots and 300,000 on home service. The French armies were outnumbered, defeated, and captured in bulk. The war lasted seven months.

In 1877 the Russian Field Army numbered 507,500 men, and was capable of expansion to 1,380,000, viz.: 835,000 at the front, 235,000 at the depots, and 310,000 for home service.[9] Only two-thirds of the field army was mobilized, and this furnished during the winter of 1877-78 a force of about 900,000 men, of whom 525,000 were at the front and the rest on the communication or garrison service. The Turkish armies were outnumbered and defeated, and three-fourths of them were captured. The war lasted ten months.

From this brief outline of the course of recent wars we see that modern warfare is everywhere conducted on a gigantic scale calling for a million of men, and those States having contiguous frontiers have devised a manner of organizing their armies by which they can throw half a million trained soldiers into the field in a fortnight. The effect of these improvements is to make war short, sharp, decisive; for the armies form so large a portion of the population that a few decisive defeats put the defeated nation completely *hors du combat*, and force it to sue for peace and trust to regaining its laurels at some future day. So long as rival States are able to maintain the terrible drain on their resources caused by the present system, seven years' wars and thirty years' wars will never occur again.

It is more probable that future wars between these States will be limited, as in 1866, 1870, and 1877, to one year; and the nation whose army is most thoroughly organized on the principles above quoted will have an immense advantage over its enemy. Promptness in gaining the

initiative is the first essential in war, and it depends on two factors, viz.: organization and means of communication.

In the last twenty years both have changed. The turnpike has been replaced by the railroad, and the non-expansive army has given way to the one founded on conscription, short service and large reserves.

What has here been said concerning organization refers only to the system of recruiting armies. In the manner of organizing them into corps, divisions, regiments, etc., no change of any consequence has been made in the last twenty years. The question of organization of companies and battalions with reference to their proper employment in battle, under the new conditions brought by a change in firearms, will be referred to under the head of Tactics.

SECOND.—THE MOVING OF ARMIES AND BRINGING THEM TO THE BATTLE FIELD, OR STRATEGY.

We are told by all military writers that the principles of strategy are fixed and eternal, that the wars of Alexander, Cæsar, and Napoleon were conducted upon the same strategic principles, and that in the nature of things no change can occur in them, since their object is always "to bring the greatest number of men upon the decisive point at the decisive moment." In order to accomplish this object the General must use such means for moving his army and communicating with it as his age affords. From the earliest recorded history down to the time of Napoleon, these means of transportation were substantially the same; troops moved over roads as fast, but no faster, than they could march, and rapidity of communicating orders depended always upon the speed of a horse. The factors by which the problems of strategy could be solved were, therefore, the same for Napoleon as for Alexander. Since Napoleon's time, however, two physical agents have been brought into practical application which have revolutionized the arts of men, and the change has been no less marked in the art of war than in the arts of peace.

These agents, it is needless to say, are steam and electricity; and their application, through railroads, steamboats, and the telegraph, has reached its greatest development in the last twenty years. While, therefore, it may be true that the abstract principles of strategy are always the same, it is certain that the means of applying them have greatly changed, and hence strategical combinations are now possible which were impossible two generations ago.

A comparison of Napoleon's campaign of 1812 with Sherman's march to the sea will illustrate this change. Early in 1812 Napoleon determined to invade Russia, and for this purpose he collected a force of over 500,000 men in Poland. But, with the slow means of communication of those days, it was not until the 23d of June that he was enabled to concentrate his force and cross the Russian frontier. At the end of eighty-

four days, and after a very bloody battle, he had advanced 650 miles, and on September 17th he entered Moscow, the Russians retreating toward St. Petersburg. The country being laid waste and the season advanced, he was obliged to retreat. In this disastrous campaign he lost 450,000 men. From it his downfall dates.

In 1864 Sherman advanced into Georgia with 100,000 men. His movement began on May 6th, and one hundred and twenty days later he entered Atlanta, having advanced 135 miles, fighting all the way. His enemy had retreated before him, but had not been destroyed. On the other hand, he quickly began a movement against Sherman's communications. Sherman immediately communicated with the General-in-Chief, 1,500 miles away, concerning his situation, and it was determined that with a large portion of his force he should press forward to the sea, where supplies would be provided for him. He, therefore, pushed on through the heart of the enemy's country, fatally crippling their resources. Having reached the sea, he moved northward directly toward the line of retreat of the main army of the enemy in Virginia, thus completing a march of about 1,000 miles through the enemy's country, and contributing very materially to the final destruction of the Southern armies.

These two campaigns contain the longest marches of modern times. One was a ghastly failure, the other a brilliant success. The failure in one case was directly due to the lack of railroads and the telegraph, and the success of the other would have been impossible without their assistance. Had the means of communication and transport been the same in 1864 as in 1812, Sherman must have been left entirely to his own resources. On arriving at Atlanta, no provision could have been made for his reception at Savannah, and he would inevitably have been obliged to follow Hood northward. Had there been no railroad Sherman could never have subsisted his army between Chattanooga and Atlanta, his base of supplies being at Louisville, 473 miles in rear. On the other hand, in 1812, had Napoleon had railroads at his command, he could have concentrated his army in Poland early in April and have reached Moscow in July. The season not being advanced, he could then have marched on St. Petersburg, telegraphing to France for a fleet of transports to meet him with supplies at some point on the Gulf of Finland.

Without attempting, however, to trace out an imaginary campaign, but confining ourselves to events that have actually transpired, it may be stated that these facts are beyond question, viz.: that in 1812, a grand army, engaged on a distant invasion, was destroyed by an inclement climate and by lack of communications; while in 1864 an army was enabled, by the use of railroads, steamboats, and the telegraph, to execute with entire success an invasion of a similar character and of equal importance. What was false strategy—because impossible—in 1812 was good strategy in 1864.

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The movement of troops and supplies by rail or steamboat attained proportions during the Civil War which have never been surpassed. Most prominent among these were the movements of Hooker's corps in 1863 and Schofield's in 1865.

They are thus described in the report of the Secretary of War :[10]

"The 23d army corps, after fighting at Nashville, in the midst of ice and snow, in December, 1864, was, on the conclusion of the campaign in the West, transferred from the valley of the Tennessee to the banks of the Potomac, moving by river and rail down the Tennessee, up the Ohio, across the snow-covered Alleghanies, a distance of 1,400 miles, and in the short space of eleven days was encamped on the banks of the Potomac, then blocked up with the ice of a most severe winter. Vessels were collected to meet this corps, the obstacles interposed by the ice were overcome, and early in February the troops composing it were fighting before Wilmington, on the coast of North Carolina."

The transfer of the 11th and 12th corps, under General Hooker in 1863, from the Potomac to the Tennessee, is the only parallel to this movement. That was an almost unexampled operation at the time. General Hooker's command contained 23,000 men, and was accompanied by its artillery and trains, baggage and animals, and accomplished the distance from the Rapidan, in Virginia, to Stevenson, in Alabama, a distance of 1,192 miles, in seven days, crossing the Ohio river twice. The 23d army corps moved 15,000 strong.

These two movements are the best known, but they are by no means the only instances of sudden transfers of large bodies of men. In the report of Colonel L. B. Parsons,[11] in charge of rail and river transportation in the West, are given no less than sixteen similar instances, which for convenience I have compiled in a tabular form, adding also a few other cases. (*See Table on next page.*)

This table is doubtless by no means free from error in certain details ; but it points out in a striking manner the powerful aid which steam now affords in the problem of bringing the greatest number of men on the decisive point. It shows that large bodies of men can be moved at the rate of one hundred miles or more in a day for considerable distances.

In his well-known work on the operations of war Colonel Hamley has stated that railways facilitate the first operations of the assailant, but subsequently they favor the defence, because "the defender, if forced to retreat, will easily destroy for the time the railways in the territory which he is quitting, while preserving the full use of those which he still covers ; whereas the assailant must either content himself with the ordinary roads, or pause to repair the railways and to reorganize the means of supply through these channels."

DATE.	LOCALITY. From	To	No. of Men.	Distance in miles.	Time in Days.	CONVEYANCE.
June, '61.....	St. Louis.....	Booneville.....	Lyon, 2,000	188	1	River Transports.
August, '61....	St. Louis.....	Cairo	Fremont, 4,000	148	2	" "
November, '61.	Cairo.....	Belmont & return	Grant, 3,000	50	1	" "
February, '62..	Cairo.....	Fort Henry.....*	Grant, 15,000	185	1	" "
February, '62..	Ft. Henry.	Ft. Donelson.....	Grant, 5,000	110	3	" "
April, '62.....	Memphis	Pittsburg Land'g	Pope, 16,000	475	3	" "
April, '62.....	Cape Girardeau..	" "	Davis, 8,000	335	2	" "
December, '62.	Memphis	Chickasaw Bayou	Sherman, 40,000	400	6	" "
June, '63.....	Cairo..... ..	Vicksburg.....	Parke, 10,000	1,000	4	" "
September, '63.	Washington.....	Chattanooga.....	Hooker, 23,000	1,200	7	Railroad.
January, '64...	Columbus, Ky...	Vicksburg.....	Smith, 7,000	600	.....	River Transports.
October, '64....	Cape Girardeau..	Jefferson City...	Mower, 7,000	325	.....	" "
December, '64.	Jefferson City,...	Nashville.....	Smith, 16,000	636	.....	" "
February, '65..	Eastport.....	New Orleans.....	Smith, 17,000	1,335	14*	" "
January, '65...	Eastport..	Washington.....	Schofield, 15,000	1,400	11	Rail and River.
February, '65..	Washington.....	Ft. Fisher.....	Schofield, 15,000	386	6	Ocean Transports.
April, '62.....	Washington.....	Fort Monroe.....	McClellan, 120,000	188	20	River Transports.
August, '62....	Fort Monroe.....	Alexandria.....	McClellan, 100,000	182	8	" "
July, '64.....	City Point.....	Washington.....	Wright, 13,000	293	8	" "
July, '64.....	Fort Monroe....	Washington.....	Emory, 13,000	188	2	" "
July, '64.....	New Orleans.....	Mobile.....	Canby, 20,000	141	.....	Ocean Transports.
May, '65.....	City Point.....	Texas.....	Weitzel, 25,000	2,200	10	" "
May-July, '65..	Washington.....	Baltim're (thence North and West.)	233,000	600 (Average)	40	Railroad.

* Including 5 days of detention and disembarkation at Vicksburg.

This opinion is not justified by the experience of our Civil War. Lee's brilliant use of the railroad running behind his lines from Petersburg to Richmond, by which he made the same troops defend half a dozen different forts in as many days, is an example where the railroad was specially favorable to the defence, and there were doubtless other examples; but, on the other hand, the instances where it favored the offensive were fully as numerous. Sherman derived quite as much advantage from the railroads as Johnston. In fact, the very existence of his army depended on a single track, 473 miles long. One-third of this was destroyed in advance of him, but the repair of it never delayed his army a single day. With a trained construction corps of 5,000 men, the road was rebuilt as rapidly, on several occasions, as three and four miles a day. An army fighting its way seldom advances faster than this. Again, in 1865, in anticipation of Sherman's arrival on the coast, a fleet of transports, containing a portion of the construction corps, together

with locomotives, cars, rails, and all appliances, was sent down by steam to Hilton Head; but, as Sherman did not stop at Savannah, they sailed back to Wilmington and Beaufort, and built a railroad from each of these points, behind Schofield's army, 90 miles long, to Goldsboro; and when Sherman's right wing reached Goldsboro it found there trains loaded with supplies. These roads were a very great advantage to Sherman's offensive movements.

It is, therefore, probable that a railroad is no more useful to the defensive than to the offensive. It is simply a tremendous military implement; and, like other implements, it finds its greatest usefulness in the hands of the most skilful General. With its aid Napoleon would have conquered Europe.

During the Civil War the construction corps built or rebuilt no less than 641 miles of railroad and 26 *miles* of *bridges;* and at one time it had in operation 2,105 miles of line, with 419 locomotives and 6,330 cars.[12] The greatest number of employés at any one time was a little less than 25,000. As already stated in the above table, at the close of the war 233,000 men were transferred from Washington to their homes—an average distance of probably 600 miles—in forty days. All of these men passed over a single line from Washington to Baltimore.

In March, 1881, at the inauguration of President Garfield, a division of Pennsylvania Militia, numbering about 8,000 men, was moved from various points in Pennsylvania to Washington—an average distance of 150 miles—in the space of twenty-four hours.

In the two German wars the theatres were comparatively so limited that railroads have played no great part in moving troops during the campaign itself. In gaining the initiative, however, at the beginning of the campaign their influence has been of a preponderating character. The use of railroads in mobilization has reached its highest development in Germany, where the plans are always in readiness for transporting the reserves to their regiments, and then concentrating the army on any given frontier in the shortest possible time.

In 1866, after the mobilization had been ordered in Prussia on May 3d, the railroads were occupied for thirteen days in carrying the reserve men to their regiments, and in preparing their rolling stock. The movement of the three armies began on May 16th, and on June 5th the armies were concentrated on the frontiers of Bohemia; "in the twenty-one days allowed, 197,000 men, 55,000 horses, 5,300 wagons were transported for distances varying from 120 to 300 miles, without any failure, and in such a manner that they attained the required spots at the very hour requisite."[13]

In 1870, when the mobilization was ordered in Germany, the railroads were given up for eight days (July 16–23) to transporting the reserves to

their regiments. This being completed, the next eight days (July 24–31) were occupied in transporting the troops to the frontier. Six lines of railroad were available for the North German troops, and three lines for the South Germans. During the eight days the former lines transported eight and a half army corps, numbering about 280,000 men, an average distance of 350 miles. At the same time the South Germans were coming over their railroads, and troops mobilized near the frontier were marching by the turnpikes. The concentration of the entire army of 440,000 men, with trains and material all complete, was concluded on the 3d of August, and the movement across the frontier began on the following day. The history of war records no achievement at all rivalling this.[14]

On the French side, owing to the confusion in the management of their railways (combined with their defective organization), the mobilization of their army occupied thirteen days (July 13–26), and when the Germans crossed the frontier, nine days later, the French had only five corps ready to meet them, numbering but 175,000 men, with 35,000 men in reserve.

In the war of 1877 the mobilization was ordered and the troops concentrated on the frontier five months before the war began. In Roumania and Turkey the railroads were very few in number. From these circumstances railroads had no special bearing upon the course of the war.

The military use of the telegraph afforded in 1864 and 1865 a spectacle such as no other war has ever seen. From his headquarters on the Rappahannock and at City Point, Grant controlled and directed the movements of 600,000 men, divided into eighteen armies, operating over 800,000 square miles of territory. Political necessities, to which purely military considerations must always give place, required this dispersion of forces; and it was the telegraph, in the hands of a master of war, which alone prevented this dispersion from degenerating into hopeless chaos. The grand combinations outlined in Grant's despatches to his subordinates of April, 1864, and January, 1865, would have been impossible, without an instrument which kept the Commander-in-Chief constantly advised of the progress of events, and enabled him to strengthen here and detach there according to the necessities of the moment.

In the three European wars, the operations being confined to a single theatre of comparatively limited proportions, the military advantages of the telegraph were limited to the actual front of the army, or to communication with the home government concerning supplies, re-enforcements, etc., etc.

The telegraph is now recognized as an indispensable part of the equipment of every army in the field, and the instances of its use are absolutely innumerable. During the last year of the Civil War over 3,000 miles of line were constructed, 2,000 miles taken down or abandoned,

and 6,000 miles were in operation at the close of the war. "It is estimated that from the commencement of the Rebellion up to June 30th, 1865, there has been constructed and operated about 15,000 miles of United States Military Telegraph—land, sub-marine and field lines."[15]

The uses of the field telegraph and of military signaling on the field of battle will be referred to under the the head of Tactics.

To resume, then, the last twenty years have seen great improvements made in the machinery by which the principles of strategy can be applied. Their effect is to make great combinations possible which were impossible prior to their introduction, to increase the celerity of military operations and to diminish the duration of wars.

THIRD.—THE FIGHTING OF ARMIES IN BATTLE, OR TACTICS.

The manner of fighting between large bodies of men depends, above all things, upon the weapons with which they fight. Every change in the character of these weapons necessitates a corresponding change in the formations of the masses of men who use them, consequently the history of Tactics is the history of incessant change. In Napoleon's words: "Tactics must be changed every two years." During the twenty years now under consideration, the infantry weapon has gradually changed from the type of the Enfield muzzle-loading rifle to that of the Peabody-Martini breech-loader, and the ammunition has changed from the form of percussion cap and paper cartridge to that of metallic cartridge. The latter musket can be fired at least four times as rapidly as the former, and its effective range is three times as great; in other words, troops are now three times as long under fire in coming into action, and during this time they receive four times as many shots. It would appear then—even neglecting the advantages of the flat trajectory of the present musket—that the fighting capacity of infantry (measured by its power of destruction) has increased twelve-fold within the last twenty years. Without, however, attaching too much importance to the exact numerical ratio, it is evident that the fighting power of infantry has greatly increased within the period named; a change in the manner of fighting has been the natural result.

Before examining the nature of this change it is well to note the fact that battles nowadays, with all the improvements in firearms, are no more destructive of life than they were a century and a half ago. This is very clearly established by the table in the Appendix (Note 16) showing the losses in the principal battles from the time of Frederick to the present. The destruction is now more rapid—5,000 men may be killed and wounded in ten minutes—and the duration of severe fighting is less, but the total losses are no greater. The bloodiest battles on record are found in the wars of Napoleon. There seems to be a limit to the endurance of human nerves, and when a certain percentage of men have been destroyed, one

their regiments. This being completed, the next eight days (July 24–31) were occupied in transporting the troops to the frontier. Six lines of railroad were available for the North German troops, and three lines for the South Germans. During the eight days the former lines transported eight and a half army corps, numbering about 280,000 men, an average distance of 350 miles. At the same time the South Germans were coming over their railroads, and troops mobilized near the frontier were marching by the turnpikes. The concentration of the entire army of 440,000 men, with trains and material all complete, was concluded on the 3d of August, and the movement across the frontier began on the following day. The history of war records no achievement at all rivalling this.[14]

On the French side, owing to the confusion in the management of their railways (combined with their defective organization), the mobilization of their army occupied thirteen days (July 13–26), and when the Germans crossed the frontier, nine days later, the French had only five corps ready to meet them, numbering but 175,000 men, with 35,000 men in reserve.

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side or the other will give way and the battle will cease. On the other hand, it cannot be denied that the danger of sudden destruction to an army in battle is now far greater than it used to be, that a mistake or a false step is more likely to lead to fatal consequences, and that troops under fire must be handled with more skill, particularly among company commanders, and must themselves have more intelligence than was necessary before the days of the breechloader.

One other general feature in this change requires notice. Which side, the offensive or defensive, has gained most by the improvements in fire-arms? Colonel Home, in his "Précis of Modern Tactics,"[17] states that this change has inured to the benefit of the offensive; "the defence has gained greatly, but the offensive has, relatively speaking, gained still more, or, in other words, the superiority of the defence over the attack is not now so marked as it was with muzzle-loading rifles." And he quotes from the writings of several officers of experience in 1870 to justify this opinion. On the other hand, in this country it is the generally received opinion that the relative gain has been enormously on the side of the defensive. A little examination will show that both statements are true under different conditions of defence, or, more properly speaking, that the relative gain is determined by the character of the defence. If both sides fight in the open without any intrenchments, the relative advantage is with the assailants, because they can load and fire as they advance, which formerly was not possible without halting. If, on the other hand, the defenders are strongly intrenched, the relative advantage of the breechloader is greatly on their side, because while protected themselves from the assailants' fire, they have now a much more effective weapon than formerly with which to inflict losses on their adversaries. As it is not likely that any great battle will be fought hereafter without the use of intrenchments, it may be affirmed with certainty that the breechloader has enormously increased the relative power of the defensive.

With these general remarks it is necessary to examine the changes in the tactics of the several arms respectively.

INFANTRY.

In all warfare, since the disappearance of the feudal system of the Middle Ages, the brunt of battle has been borne by the infantry. Cavalry, artillery, and engineers are used to prepare, assist, or follow up the action of the infantry, but the latter has done the hard fighting, and in general decided the battle. The manner of employing it in the wars of Napoleon is very fully described by Jomini.[18] This employment, on the offensive, was based upon the principle of a skirmish line to open the battle, and then retire or protect the flanks, and a line of columns to overwhelm the enemy by its momentum. The principle was, in short, that of "shock tactics." The great wars of the last twenty years have completely over-

thrown this principle ; since the firearm is now of such a character that a column can not live under it, and its momentum is destroyed long before it can reach the enemy. The tactics of the present day are therefore essentially "fire tactics," and the problems of battle are how, on the one hand, to deliver the most deadly fire, and, on the other, how to advance through such a fire. The first is accomplished by throwing up temporary fortifications to cover the infantry on the best position available ; and the second by manœuvring against the flanks of these positions so as to compel the defenders to come out and fight in the open, or by advancing against them in successive waves of thin deployed lines. From being a mere accessory in the battle, skirmishers have now become the real body of the attack. The formation of these thin lines of attack has been developed upon different principles in this country and in Europe, which will be subsequently referred to.

Two factors, nearly equal in importance, have brought about the change in the details of battle ; these are, first, the constant use of temporary fortifications, and, second, the invention of breechloading muskets. The first of these reached its full development during the Civil War ; the second is of subsequent date.

In considering the tactics employed by infantry during the Civil War we must not forget the peculiar topography of the country in which the battles were fought. Dense woods, absence of good roads, and the presence of immense numbers of small streams—these were the prevailing topographical features of the battle-fields of Virginia and Tennessee and Georgia. They were in every way different from the open rolling plains, cleared and cultivated, and covered with excellent roads, which have been the battle-grounds in France and Germany and Italy. Moreover, of the former countries no accurate maps in detail existed, so that the attacking force knew no more of the enemy's position than could be learned by observation and reconnoisance ; on the other hand, the long settled lands of Europe have been mapped in the minutest detail. It is not necessary to point out the enormous advantages conferred upon the defensive in the Civil War by these topographical features, and both sides quickly learned their value, and saw the great benefits which could be obtained by even the smallest protection in the form of an earthen parapet. Field fortifications thus sprang into importance—at Yorktown in the East and at Fort Donelson in the West—in the first serious operations of the war ; and they continued to be used without interruption until its close. Shiloh, Manassas, and Antietam were the only great battles in which they were not used. The character of these fortifications ranged through every degree of strength from the breast-work, made of rails and earth thrown up in half an hour with bayonets and broken canteens, up to the enclosed redoubts of strong profile, flanking defences,

and bomb-proof traverses, such as were erected around Richmond and Washington. They may, however, be divided into two general classes, those planned in advance and executed with great care, forming the defences of great intrenched camps of a semi-permanent nature, and those made hastily, and often by the mere instinct of the troops themselves, for the defence of a position occupied only temporarily. The defences of the former class brought about at Vicksburg and Petersburg what was, in fact, a siege, and they were never carried in open assault, though often assailed. The defences of the latter class were found on every battle-field after 1863, and on hundreds of positions where a battle did not result; it was the practice of both armies to protect themselves in this way for the night, and the movements of Grant's army from the Rapidan to beyond Petersburg, and of Sherman's from Chattanooga to Atlanta, can be traced even at this day by the relics of these lines of trenches. The questions, therefore, to be studied in the battles of the Civil War, are:

First, How were these works defended?

Second, How were they attacked?

Third, Were the attacks successful or unsuccessful?

The defence was of a very simple character. The defenders usually occupied their trenches with as many men as could be covered by them, holding the rest in reserve for emergencies; and from these trenches they poured forth a deadly fire upon their assailants. The defence was of a passive character without counter-strokes. Meade at Gettysburg and Lee at Fredericksburg made no attempt to attack their adversaries after the latter had fallen back in disorder before the terrible fire of the intrenchments. The only use made of the offensive by the defenders was when their flanks were turned, as in the Wilderness and at Atlanta, and they came out to attack the assailant in flank.

The attack was a much more complicated matter, and opinions are divided as to the advisability of a direct assault under any circumstances. Sometimes it succeeded and sometimes it failed. At Fredericksburg, Gettysburg, Vicksburg, Kenesaw, Cold Harbor, and Petersburg direct assaults were made against intrenchments of slight profile, and in every instance they were repulsed with great loss. At Donelson, Chattanooga, and Nashville, assaults were made upon intrenchments of substantially the same character, and they met with brilliant success. We must, therefore, examine the details of these battles in order to find the reasons for success or failure. In doing so, we find that in only one instance (Gettysburg) was the artillery used in large masses to assist the assault, and then it had little or no influence upon the result. This experience is entirely different from that of the war of 1870, but for lack of space it is impossible to attempt to trace out the reasons for it. We next find that in all the unsuccessful battles above mentioned, except Fredericks-

burg, the assaults were made without any attendant manœuvres. At Fredericksburg there was manœuvring, the plan apparently having been to roll up Lee's right flank and then attack his centre. But the plan seems to have been ill-defined, and was not fully understood by the corps commanders. The attack against Lee's left was made in small force and was repulsed. The assault subsequently made against his centre at the "stone wall" was, under the circumstances, purely and simply a frontal attack.

It may, therefore, perhaps, be stated as a fact beyond dispute, that a simple frontal assault, unaccompanied by diversions upon other parts of the field, and unprepared by the use of artillery in large masses, cannot succeed.

If from these instances of failure we now turn to the battles of Chattannooga and Nashville, we shall find that assaults can be made with success, provided proper tactical dispositions are made of the troops. At Chattanooga, Bragg occupied a well-intrenched line about seven miles long on Missionary Ridge, with his left flank thrown forward on Lookout Mountain. His army numbered 45,000 men, or about three men to a yard of intrenchments and one-fourth of his force in reserve. Grant had 60,000 men, but half of them were closely invested in Chattanooga and cut off from continuous communication with the rest, and a large part of his force under Sherman had only just arrived. The advantages of the situation of affairs were all on the side of Bragg, and his position was one of great natural strength and very thoroughly fortified. Grant made his attack by throwing forward his right under Hooker to carry Lookout Mountain, and his left under Sherman, to seize the Southern end of Missionary Ridge; these positions being taken on either flank enabled him to unite the three parts of his army into one. The next day he ordered Sherman to move against Bragg's right and Hooker against his left, in the expectation that Bragg would weaken his centre, which was then to be attacked by Thomas. Sherman fought hard all day, but was unable to make any impression upon Bragg's right, because Bragg withdrew from his centre to resist Sherman's attack. Seeing this, Grant, without waiting for Hooker's advance, ordered Thomas' four divisions to assault the triple line of intrenchments forming Bragg's centre on Missionary Ridge. These works were carried in an open assault, lasting from about 3 P. M. till dark of a short winter's day, and the result was the complete rout of Bragg's army. One division (Sheridan's) of the assaulting line, lost about twenty-five per cent. of its strength, but the losses of the whole army were by no means excessive, and the victory was of the most decisive character.

Equally valuable results were obtained at the battle of Nashville. Here both armies faced each other strongly intrenched—Thomas having about 40,000 infantry and 10,000 cavalry, besides a number of quarter-

master's employés temporarily organized for the defence of his works; Hood opposed him with about 33,000 men, occupying an intrenched line between five and six miles long. Thomas garrisoned his works with the quartermaster's employés, and made a strong demonstration against Hood's right with a force of about 7,000 men. Having diverted the enemy's attention with this he then moved the bulk of his army in a grand left wheel, pivoting on a salient angle of his own fortifications, and throwing a force of overwhelming strength on Hood's left flank. This force assaulted and carried all of Hood's works on that flank, and but for the shortness of daylight (the date being the middle of December) would have completely destroyed Hood's army. Under cover of the darkness Hood withdrew to a line of hills in the rear and intrenched them during the night. On the following day Thomas made a vigorous assault on the right of these new intrenchments, but was repulsed. As Hood had weakened his other flank in order to resist this assault, Thomas immediately attacked that flank, and with entire success. A renewed assault against the right was also successful, and Hood's army was completely routed, pursued, and dispersed. It never appeared in the field again. Thomas' losses were about twelve per cent. of his strength—*i.e.*, about the average of great battles.

Both of these battles were won against a well intrenched enemy by the same means—*i.e.*, by proper tactical dispositions of the troops based upon a thorough study of the strong and weak portions of the enemy's line. They teach the lesson that against such dispositions intrenchments are not impregnable.

Passing now to the War of 1866 we first find the breechloader in action and doing great execution; but we find almost no use made of fortifications. In the battle of Königgratz the Prussians, who were the assailants, lost about 9,000 men, and the Austrians, on the defensive, lost over 20,000 killed and wounded, besides 20,000 prisoners and 170 guns. Nothing more is needed to tell the effect of the breechloader. Singularly enough the Austrians had fought alongside of the Prussians in 1864, when the latter were already armed with the needle-gun, and had failed to notice its value. But it was not alone the needle-gun of their enemy which lost the battle of Königgratz for the Austrians. The disaster was very largely due to their own failure or neglect to fortify their position. Field Marshal Benedek had already decided to accept battle on this ground on the night of July 1st, and this gave him thirty-six hours in which to fortify his position. It was one of great natural strength, consisting of a convex line of hills like those at Gettysburg, extending from the Elbe, on his right, to the high hill of Nieder Prim, on his left—a distance of between nine and ten miles—to defend which he had 206,000 men, with 600 guns. Three-fourths of his line was protected in front by marshy streams, and the

whole of it was on high ground, which could only be approached over a gentle slope, affording full benefit to his fire. Had the whole of the 2d of July been devoted to intrenching this position, it would have been almost impregnable. All that was done, however, was to put the villages in a state of defence, cut down some timber in the few groves of trees, and construct half-a-dozen emplacements for field artillery in a position so faulty that the troops assigned to occupy it actually took up their position 2,000 yards in advance of it. Concerning these works the official account quotes from an Austrian military journal as follows: "Lastly, the 4th (Austrian) corps was not informed that earthworks had been thrown up, marking the front line of the position. When they were first seen, early on the 3d of July (the day of the battle), their position in the hollow of the ground only excited a feeling of surprise, and led to the supposition that they were merely intended, in the event of a retreat, to enable the troops to make some slight stand on this slope, which was overlooked from all sides."[19] The proper position for these fortifications was on the heights 2,000 yards ahead, and had these been fortified they might very probably have stopped the advance of the Prussian Guards, which broke through at this point, and seizing the very centre of the Austrian position put their whole army to flight with great loss.

In the War of 1870 both sides fought with the breechloader, the French having the superior weapon. The superior mobility of the German Army found the French unready, and threw them from the beginning upon the defensive; and one of the chief causes of their terrible defeat was the failure to thoroughly intrench their positions. The campaign was virtually decided by the battles about Metz. On the 14th of August the First German Army came up with a portion of Bazaine's troops still on the east bank of the Moselle. It immediately attacked them, and partly retarded the retreat. On the 16th the vanguard of the Second German Army struck the flank of Bazaine's army moving out of Metz toward the west. It also attacked and held the French in place till the whole of the Second Army and part of the First came to their assistance. On the 18th these two armies again attacked Bazaine, and defeated himself with great loss, and drove him into Metz. An examination of the elaborate maps accompanying the German history of this war shows that Bazaine's line on the ridge extending from the bluffs (500 feet high) of the Moselle on his left, behind Gravelotte to St. Privat and the woods beyond it on the right, was one of great strength, and had it been fortified throughout its extent (for which there was ample time on the 17th) it would have been almost unassailable in front. Nothing was done, however, except to throw up a few insignificant trenches on the flanks of the villages. Reliance was placed on the walls of these villages for defence, but the German artillery crumbled them to powder. When we read of the spirited defence made by

the French, and how the Prussian Guards barely succeeded at nightfall, with a loss of 8,000 men, in carrying the front of St. Privat, it is impossible to resist the conclusion that the issue of this battle—and with it of the campaign—would have been far different had the French line been properly fortified.

In the war of 1877 in Turkey we find both sides armed with improved breechloaders, and again a much superior weapon in the hands of the defensive; but here the fortification of the battlefield was carried to its utmost limits. These fortifications enabled an inferior Power to prolong through ten months a struggle which at first was thought by every one to be perfectly hopeless.

It was the habit of the Turks to fortify every place where they stopped for twenty-four hours; and if they remained longer they constantly worked at their fortifications, elaborating and strengthening them until finally they possessed the character of great intrenched camps, inferior in strength only to permanent fortresses. The defences of Plevna began with a few trenches in July, and ended in December with forty-seven redoubts and 60,000 yards of covered way and trench connecting them. The town of Plevna was of no consequence in itself, but it was a meeting place of several important roads, and was so close to the flank of the Russian line of operations that no advance was possible so long as it remained in the hands of the enemy. The assaults made by the Russians upon this and other fortified positions of the Turks convey the same lesson as those of the Civil War. Some succeeded and some failed. The power of the breechloader has still further strengthened the defensive behind fortifications, but it has not inevitably made such positions unassailable. Two of the assaults made at Plevna (July 20th and July 30th) were made with forces inferior in number to those defending the works. Such assaults were of course doomed to failure. The third assault (September 11th) was made with a superiority of force, but with such faulty tactical arrangements that the troops arrived on the field successively, the first line being beaten back before the second came to its support. Skobeleff's attack, which succeeded, was directed (owing to ignorance of the ground) against a position which was enfiladed and surrounded, and from which he was afterward driven out by a superiority of force. In all these assaults there were such faults on the part of the assailants as to justify the opinion that their failure was not altogether due to the strength of the defence. In other words, it is not proved that the trench and breechloader are necessarily impregnable. At Lovtcha strong works, defended by breechloaders, were carried in open assault, the defence being prepared by a judicious use of artillery, and at Shenova similar works were carried without any artillery at all.

It only remains now to examine the actual formation of troops best

suited to attempt an assault against a fortified position defended by breechloaders. This is pre-eminently the question of modern battles. As previously stated, two essentially different principles have governed the development of tactics to meet this problem, in this country and in Europe. In no American war have large or deep columns ever been used in battle; the formation has always been in line. Upton's deployment of skirmishers by numbers is the natural outgrowth of this traditional tendency. In Europe the great battles of the early part of this century were all fought by heavy columns, on the principle of "shock tactics;" from this, when a firearm appeared before which no column could stand, the transition to open order fighting was naturally accomplished by small columns, each throwing out a narrow line of skirmishers in its front. This is the formation of "company columns," originally devised by Prussia and since copied by all Europe.[20] In this country the tactical unit has always been the regiment of one battalion, numbering 1,000 men, and divided into ten companies. In Europe the tactical unit is the battalion of 1,000 men, but three (latterly four) battalions are united into one regiment, and the battalion consists of only four companies.

In the Civil War, as already stated, the habitual formation for attack was a division in three lines of brigades, with a distance of 100 to 200 yards, preceded by one or two lines of skirmishers. This was the formation of Sedgwick's division at Antietam, of Meade's at Fredericksburg, of Pickett's at Gettysburg, of Sheridan's at Chattanooga. The principal firing was done by the skirmishers, little or none by the troops in line. One side or the other usually gave way before coming to close quarters, although occasionally there were hand to-hand encounters, either with the bayonet or clubbed muskets.

In the battles above cited there were distinct, clearly defined movements of considerable bodies of men over comparatively open ground. Many, perhaps the majority, of battles do not admit of such movements; the fighting is rather composed of contests between small groups at certain points, advancing here and receding there, but the whole forming an irregular waving line. Even in the Civil War, before the day of breechloaders, the formations above quoted were much too compact, the losses in each of the four cases above cited being respectively fifty, forty, seventy-five and twenty-five per cent. With the breechloader the losses in such a formation will be equally great and accomplished in a much shorter space of time.

In the battles of 1870 the habitual formation of the Germans was in lines of "company columns." There was no instance of an advance of any body as large as a brigade in line of battle. The battles invariably consisted of a series or row of minor struggles approximately on a general line;

and each of these minor struggles was carried on by a brigade, or perhaps a division, whose battalions were deployed from the "company columns," and the front of which was seldom greater than that of about four battalions in line, say 1,200 yards. The struggle was developed by the skirmishers advancing in groups, closely followed by their supports, and constantly fed by them. Occasionally, as in the case of the Guards at St. Privat, the supports came under fire in the form of half-battalion columns, and the result was a terrible and unnecessary sacrifice of life.

In the war of 1877 some of the assaults were made in lines of company columns and some in a deployed line of brigade front without supports. The company columns were badly managed, and advanced much too far under fire before deploying. The result was the same as in the Civil War and in 1870—a useless sacrifice of life, and generally a repulse. In Skobeleff's assault at Plevna the regiments came under fire by battalions in line, the men not touching elbows, but about two paces apart (a strong skirmish line in fact), the leading battalion deploying one company as skirmishers with greater intervals. The distance between the battalions was about 300 paces, but this was regulated by the division commander, according to the amount of resistance developed. This assault lasted about an hour, and carried a strong line of works with a loss of about fifteen per cent of its strength.

From the experience of these wars it is evident that intrenchments must be assaulted in open or dispersed order. By this it is not meant that the troops shall be scattered about without cohesion and subject to no control, but that there shall be a prescribed formation in which they shall be most thoroughly instructed, the object of which is to bring them under fire as skirmishers at small intervals, and not in compact masses; this line of skirmishers to be constantly and incessantly fed from supports in its rear as it gradually makes its way forward from point to point, by the aid of its fire and not by its momentum or moral effect; and finally, if the enemy does not yield, this line of skirmishers to be strengthened to about the solidity of a close line of two ranks, still with supports behind it. And with this to make a final rush on the defender's works and try conclusions hand-to-hand if he still does not yield. The whole principle of fighting, in the present stage of firearms and intrenchments, must be based upon this idea of a thin line constantly fed and constantly growing stronger and stronger.

The most convenient and compact formation in which to handle troops on the battlefield out of range of fire is universally acknowledged to be the battalion column by divisions, or doubled on the centre. All systems of tactics contain this formation. The problem is how most efficiently to develop and feed the lines of skirmishers from this formation. In our present tactics it can only be done by deploying into line of two

ranks, and then into skirmishers either by the numbers (Upton's Tactics, par. 358) or by companies (par. 332). The latter spreads the battalion over a front of 1,600 yards, and the Colonel loses all control over it. The former does not extend the front of the battalion, but it has the defect of keeping the supports in one body instead of distributing them in small fractions along the line.

In the European tactics the fighting line is formed by deploying the double column into a line of company columns, and each company sends forward its own skirmish line and keeps it fed by small supports drawn from itself. The two methods of formation for a command of four battalions are shown by the diagrams in Note 21.

It must be observed that the principle of fighting by a thin line constantly fed and strengthened from the rear inevitably entails the mixing of men of different commands towards the close of the action. If the skirmish line is developed over a narrow front by a single battalion then the men of different companies get mixed together; if a single battalion covers a front equal to its own length in line (as in the deployment by numbers) then a second and a third battalion must reinforce it over the same ground, and the men of different battalions are mixed up. There is no possible way to avoid one or the other of these elements of confusion, and in the choice of evils it would appear that the former is the less.

The practical result in actual battle of this open order fighting is that men fight in small groups, the whole keeping an approximate alignment, but each group running forward from one bit of shelter to another, stopping to fire and regain their breath, and then running forward again —keeping a sharp eye all the time to see if somebody is coming on behind them. For these groups the unit of four (or eight), which forms the basis of our present tactics, has many advantages; but it is evident that the method of deploying skirmishers from a line of two ranks—the only practicable method prescribed in the tactics—is unwieldy, because it spreads the whole battalion over too great a space. A method of deployment directly forward from smaller colums appears to be necessary, and this was the problem upon which General Upton was engaged at the time of his death. He inclined to the opinion that in order to accomplish this it was necessary to adopt the four-company organization, because a battalion of 1,000 men was too large for one man to thoroughly control in open order, and the company of 100 men was not large enough. The full discussion of this question would occupy too much space here. It would appear, however, that with a ten-company battalion we could derive all the advantages of the European tactics by adopting a "company column" formation, as follows (Note 22): The battalion in company columns would be formed with the fifth and sixth companies in line in the centre, with the fourth and seventh companies in their rear, at

half distance; the third and second companies in similar formation at company interval on the right, and the eighth and ninth at the same interval on their left; the first and tenth companies each in line opposite the intervals. The battalion in this formation would correspond very closely to the German line of company columns, shown in Note 20. It would cover a front of 200 yards, and its fighting would be confined to that front.

Coming on to the field in double-column the battalion could be deployed into line of company columns by the rear companies advancing to the right and left. The flank companies would then advance through the intervals and form the first skirmish line covering the battalion front, followed at, say, 200 paces by the two columns on the flanks forming the first line of supports; and in the rear of these, at, say, 300 paces, the four companies in the centre, forming the second line of supports. The senior Captain commanding each column of two companies should deploy his column into a skirmish line whenever in his judgment the fire becomes hot enough to require it. At the close of the action, the battalion, minus its losses in killed, wounded, and shirkers, would come upon the enemy's works in a confused mass of, say, 700 men (supposing it started with 1,000), occupying a front of 200 yards, *i. e.*, a formation about as compact as a two-rank line. This manner of engaging a line throws great responsibility upon the senior Captains. This is inevitable, for all recent experience shows that the result of a battle, under fire of breechloaders, depends, in a very large measure, upon the skill of the commanders of small units.

The infantry arm at present is the breechloader, firing easily (in actual battle) about six shots a minute. Every nation, however, is experimenting with magazine guns, which, under carefully prepared arrangements, fire thirty shots a minute, and in the excitement of battle would, perhaps, average fifteen a minute. At the critical moment of the attack such guns may render great service, and they will make the attack more than ever difficult; but it is not certain that they will render it impossible, and they will not change in any way the principles upon which it must be conducted.

The expenditure of ammunition for such arms may often be very great for a short time, and it is not safe to go into battle with less than 100 rounds on the person and 100 more close at hand, preferably on pack-horses. In spite of the necessity of thus providing against emergencies, the average expenditure of ammunition is very small. At Königgratz the Prussians fired only one round for each man engaged. During the entire war of 1877 the total expenditure of ammunition was only at the rate of forty-two rounds per man. The greatest expenditure (Skobeleff's Division) was 140 rounds for the whole war. The greatest

number of rounds fired by one regiment in a single battle was ninety-four.

The great extent to which fortifications are employed on the field of battle renders an entrenching tool a necessary part of the infantry soldier's equipment. Various attempts have been made to combine this tool with the bayonet, but they have not been successful. Nothing will take the place of the spade, and it must be carried on the person, for if it is carried in wagons it is never at hand when most wanted. The great losses suffered by Skobeleff's men at Plevna, for lack of intrenching tools, induced his men to carry a common long-handled spade on their shoulders from Plevna to Constantinople. This was extremely heavy and awkward, but it was very serviceable. It is doubtful, however, if ordinary troops can endure long marches with this extra weight, and a lighter, though less efficient, tool is needed. Such a spade has been designed by a German named Linneman, and it has been adopted by nearly every European army; the blade is six by eight inches, and the handle is twelve inches long. It weighs about four pounds, and is worn along in a pouch suspended from the waist belt. As already stated, this spade will hereafter be a necessary part of the infantryman's equipment—as indispensable as his musket and cartridge-box.

CAVALRY.

In all military books written before the twenty years now under consideration, a most important rôle was assigned to cavalry on the field of battle. Mahan, following the precepts of the French text-books, says: "As the functions of heavy cavalry are to bear down all opposition, and present an impassable wall to the enemy's efforts, its duties are confined to the battlefield. There placed in the reserve, it is held in hand until the decisive moment arrives, when it is launched forth to deal a blow from which the enemy hopelessly struggles to recover, either to achieve victory or to fend off utter defeat."[23]

There has been no such use of cavalry in the great battles of the Civil War, of 1866, or of 1877. Shall we, therefore, conclude that cavalry has no longer any career on the field of battle? Such opinions should not be formed hastily, bearing in mind Jomini's caution against "a fatal tendency to reduce every system of war to absolute forms." The effect of quick loading muskets has undoubtedly been to make cavalry much less formidable against infantry than it formerly was. The picture of the "dashing, bold hussar" conveyed to the mind the idea of his being in constant danger. Such is now far from being the case. He is constantly in the presence of the enemy, but observing him, not fighting him. The losses of cavalry, in proportion to its strength, in any of the recent wars are scarcely one-fourth the losses of the infantry.

Yet, before saying that cavalry can never be used in battle against breechloaders, we should carefully study the war of 1870 in France.

As is well-known, in the battle of Vionville the Prussian cavalry performed an inestimable service at the crisis of the battle, though at a terrible sacrifice. At the battle of Woerth the French cavalry attempted a similar feat, which resulted in nothing but its own destruction. These two cases must be examined in some detail; the data are taken from the German official history of the war.

At the battle of Woerth[24] the French army, numbering about 45,000 men, under MacMahon, occupied a strong position on hills to the west of the Sauerbrook. The advance guard of the Third German Army, numbering about 90,000 men, under the Crown Prince of Prussia, came upon this position at daylight of the 6th of August, 1870. It immediately opened battle, and during the course of the day nearly all of the Crown Prince's army was brought into action. The Germans began the battle by a well-directed fire of eighty-four guns (subsequently increased to 200), and after this had shaken the French line, the infantry of the 5th corps was ordered to cross the brook and carry the heights above Woerth. This corps met with a most determined resistance, and was unsuccessful during two hours of hard fighting; finally, however, about 1:30 P.M., it carried the crest of the heights in front of the French centre. About this time the Germans directed an attack with their 11th corps against the right of the French position near the village of Morsbronn, about two miles from Woerth. The Prussians carried this village. Then[25]

"General de Lartigue, who commanded the French right wing, saw how greatly the position in the rear of Woerth would be compromised if the assailant pushed beyond Morsbronn. In order to relieve at once the wing which appeared most directly menaced, he ordered Michel's brigade of cuirassiers, which was formed in the rear of this wing, to throw one of its regiments upon the flank of the assailant. It did more than was asked, for two regiments of cuirassiers moved forward at once, followed by the portions of the Sixth Regiment of Lancers which were attached to them. Now the ground, which they had probably neglected to reconnoitre in advance, was particularly unfavorable to cavalry. Rows of trees, stumps cut off even with the ground, and deep ditches, formed an obstacle to the movement of compact masses, while the gentle slopes, and otherwise completely open character of the hills, gave the infantry the full benefit of its fire.

"The brigade advanced in echelons by its right, having in the first line the Eighth Regiment of Cuirassiers, formed in colums by squadron, then the Ninth Cuirassiers, with three squadrons deployed and the fourth following in column, then finally the lancers.

"This mass of more than a thousand horses rushed forward at random on Morsbronn, without at first perceiving any adversary. Its squadrons

sustained with admirable courage the fusilade directed against their left flank by the infantry posted at Albrechtshaüserhof, while they, going at full speed, sought to reach their adversary in process of formation at Morsbronn.

"The latter was forming to move forward, with the Thirty-second Regiment in the first line and the Ninety-fourth in rear. The right battalion of the first of these regiments had the 2d and 4th companies on the heights to the north-west of Morsbronn; the 1st and 3d companies were still in the streets of the village. On the left, the second battalions of Thirty-second and of the Ninety-fourth had already emerged and were advancing—the latter in double columns of half-battalion, the former in company columns. The 3d company of pioneers had rejoined. The fusilier [Third] battalions were still on the south of Morsbronn; the companies of the Eightieth Regiment were just approaching the northern entrance of the village.

"When the [German] troops of the first line appeared on the crest, the [French] infantry, posted in the bunches of woods to the south-east of Eberbach, opened against them a fire so well directed that their movement was for the moment arrested. At this moment the enemy's cavalry fell upon them.

"These troops might have found support in the neighboring vineyards and hop-gardens; further in advance some rows of trees also offered them a shelter within reach. Nevertheless, they awaited, without flinching, the rash attack of the cuirassiers, without having recourse to squares, nor even to squads of skirmishers, but in the formation which afforded the greatest advantage to their fire. The Eighth Cuirassiers began the charge, rushing on the infantry, which had already emerged from the village. Under the fire at the same time of the two companies and the two half-battalions of the Thirty-second, which deployed and executed a half wheel to the right, the cuirassiers suffered, in the twinkling of an eye, enormous losses. The débris of the regiment, rushing to the right and left of the infantry, and thus riding down a portion of the skirmishers of the 2d company, sought to gain the open either by passing through the village or around it on the North; but in the streets they fell foul of the two companies, and finally, on the east side, of the skirmishers, of the Eightieth. This regiment alone got possession of the Colonel, of seventeen officers, and of a large number of the French cuirassiers; they picked up, also, 130 horses not wounded. Very few of the brave horsemen succeeded in cutting their way through and escaping towards the south-east.

"The Ninth Cuirassiers had but little better success. It was received at 300 paces by the well directed fire of the company of pioneers grouped in mass on the left of the infantry. One corner of this group was over-

thrown under the impetuous shock of this cavalry, which, obliquing thence in part towards the village, which it entered, and in part towards its outskirts, which it passed around, also fell foul of the Eightieth. Pursued by its rapid fire, the confused remnants of the two regiments rushed on at mad speed towards the south-east. The lancers, which came in the last line, met in front of them the left wing of the Prussian infantry. The 8th company of the Thirty-second turned to the left, deployed, and directed against the cavalry charging it a volley, followed by a rapid firing, with great effect. All of those who were not unhorsed rushed past Morsbronn and followed the cuirassiers in the direction of Dürrenbach and Walbourg.

"The disbanded remnants of this mass of cavalry then endeavored to rejoin their infantry by a long détour, which brought about new and murderous encounters with the Thirteenth [German] Hussars, and the infantry coming from the Sauer. * * * * * * *

"Michel's brigade, as well as the Sixth Lancers, may be considered as having been annihilated; very few of them rejoined their army safe and well. * * * The losses of the [Prussian] infantry were quite insignificant."[25]

About two hours later, in the same battle, the flank attack of the 11th corps had made considerable progress, and this corps had joined on its right with the the 5th corps near Woerth. A determined effort was then made, and the two corps carried the key point of the French position on the heights behind Woerth and near the hamlet of Elsasshausen.

MacMahon saw that he must regain this point or the battle was lost. He therefore sent a strong column of infantry against the 11th corps, and this corps being in some confusion—the regiments and battalions being mingled together, as is inevitable after two hours of fighting and advancing through a wood—it was at first driven back. It soon, however, in turn checked the advance of French infantry. At this critical moment the French sent forward a division of cuirassiers—four regiments, numbering in all probably 1,800 men.

The Prussians, although in disorder, received them, as they were, in open formation, and they broke the charge, dispersed the whole division with a loss of nearly a fourth of its strength, and did not yield a foot.

The French counter-attack having failed, the Prussians renewed their advance, broke the French centre and right, and put the whole army to rout.

Now, in examining the disastrous action of the French cavalry in this battle, we notice that the ground was bad because there were stumps of trees on it, but it does not appear that these obstacles threw the cavalry into any disorder or prevented it from reaching the enemy at full speed

and in echelons of squadrons, as the books prescribe. Except for the roughness of the ground, both charges were admirably executed. They were delivered exactly at the proper moments; the first when the enemy was making a dangerous advance against a flank, and the second when his advance had been partially checked, and his troops were out of breath and in disorder. Both were delivered with the utmost bravery and spirit. Yet the only result was that the first brigade was annihilated, and the second division was dispersed with great loss. Neither one caused the infantry to yield a foot, nor did the infantry even take the trouble of forming squares. It stood still in open formation, where every man's musket would tell, and by its fire alone it destroyed its antagonist with merely trifling loss to itself.

Let us now examine the case at Vionville, where the results were entirely different.

At this battle[26] (August 16, 1870) the advance of the Second German Army, moving northward along the Moselle, struck the flank of Bazaine's army, then endeavoring to retreat westward from Metz. General von Alvensleben, commanding the 3d corps, which had the advance, immediately determined to attack the whole French army with his corps, in the hope of holding it in place until the rest of the Germans could come up and drive it back into Metz. During the day the Germans succeeded in bringing into action about 90,000 men, but the greater part of the battle was fought by the Prussian 3d and 10th corps, whose infantry numbered 45,000 men. Fighting against more than three times their number the Germans held the French in place, and two days later, when their whole army had come up, drove them back into Metz, where they surrendered two months later.

The Prussian 3d corps (Brandenburgers) came into action at 10 A.M., and carried on a hard fight against the French 2d and 6th corps until 2 P.M. During this time the French had sent a brigade of cavalry against a portion of the Prussian infantry, and it had been repulsed with great loss. The Prussians had then riposted with a division of their own cavalry, but it accomplished nothing for lack of room for deployment. At about 2 P.M. the French 6th corps, which completely outflanked the Prussian left, possessed a very advantageous position for its artillery, and with one of its divisions was advancing almost perpendicularly against the Prussian left flank. The French 3d and 4th corps were also in motion on the right of the 6th, moving perpendicularly towards the rear of the Prussian line. The situation of the Germans was most critical. General von Alvensleben had not a man of the infantry of his own corps in reserve, and the leading division of the 10th corps was yet a long way off. Under these circumstances "nothing remained but to try what could be accomplished by the self-devotion of the cavalry—for there was no-

thing else at hand—throwing itself against the attack projected by Marshal Canrobert."

The 5th cavalry division, composed of three brigades of three regiments each, was the only one available. Four of these nine regiments were already occupied in different parts of the field, and it was thought prudent to retain one brigade in reserve to protect the left flank of the infantry during the threatened attack. This left two regiments, and it was determined to deliberately sacrifice these two regiments by hurling them against the batteries and the advancing division of the French 6th corps. As they were moving forward they received an order to send one squadron from each regiment as skirmishers into a wood off to their right. This left six squadrons, numbering barely 800 men, commanded by General Bredow. He received the order to make this charge.[27]

"From the very beginning he understood that, in the circumstances stated, the end could only be accompanied by a blind charge, pushed to the uttermost, and in which it was the duty of the cavalry to know how even to sacrifice itself, if necessary. This being understood, the General began, without losing an instant, to execute the order. He led forward at first, facing east, the six squadrons remaining with him, then wheeled by platoons to the left, in order to take advantage for his advance of the ravine to the north of Vionville; once in the ravine he broke by platoons again to the right, took intervals while marching towards the crest which rises on the east, and then deployed into line—the Seventh Cuirassiers on the left, the Sixteenth Uhlans on the right." (See sketch, Note 26.)

"Received at short range by a terrible fire of artillery and musketry, the brigade rushed into battle on the nearest masses of the enemy. The first French line was pierced; the batteries were passed through, the gunners and the teams were cut to pieces.

"The second line could not resist this whirlwind of cavalry; the artillery in position on the heights further to the rear brought up its limbers and took to flight. Carried away by the ardor of the combat and by the thirst for victory, the Prussian squadrons even cleared in their run the valley which descends from the Roman road towards Rezonville, until finally, after a charge of 3,000 paces [a mile and a half], they saw the French cavalry coming out on all sides to meet them. * * *

"* * * General Forton threw Murat's brigade of dragoons against the front of the Prussians and the Seventh Cuirassiers against their left, while two squadrons of the Tenth Cuirassiers took them in rear. At the same moment Valabrègue's cavalry division was advancing on the north of Rezonville.

"General Bredow sounded the rally.

"Already blown by their long run, decimated by the fire of the enemy, without any reserves in the rear, and surrounded on all sides by

the enemy's cavalry, it was only a question now of opening a way for retreat. After some very sharp skirmishes with the French horsemen, the two Prussian regiments again passed through, in an opposite direction, the lines of artillery and infantry passed through on their advance; their débris fell back quickly towards Flavigny, under a hail of bullets which accompanied them.

"The enemy's cavalry did not attempt to pursue them seriously. They preferred to make prisoners of the men who had been wounded or left behind by their exhausted horses."

Out of the 800 who made the charge, 380 were lost.

"This heroic sacrifice of the cavalry had not been sterile. The offensive movement of the 6th corps had been stopped by it, and soon after was completely abandoned; probably by order of Marshal Bazaine, who feared at that moment a new attack against his left. At all events, throughout the day the French did not again attempt an offensive movement by Rezonville. * * * * *. It was then three o'clock. In consequence of the momentary exhaustion of both sides, the struggle was carried on for the time only by a more or less active cannonade between the fractions of the two hostile armies which faced east and west. But from the south, as from the north, fresh troops have been coming up to the west of the field of battle on which the fighting had been conducted up to that time. In the course of the afternoon the action will be renewed, furious (acharné) and murderous, between these new adversaries." [27]

Now, if we compare this case with the one already cited at Woerth, we find that there was no substantial difference in the circumstances except that the ground near Vionville was somewhat more favorable for hard riding; the charge, in this case as in the other, was made at a time when the infantry was exhausted with long fighting, and had no reserves left, and when the enemy was beginning a flank attack of a most threatening character. We find also that the result to the cavalry was the same in each case, *i. e.*, destruction. But the result to the enemy was altogether different. At Woerth the French cavalry made no impression whatever on the Prussian infantry; at Vionville the Prussian cavalry brought the French attack at a most critical moment for the Prussians to a complete standstill for a whole hour, viz.: from 3 to 4 P.M. During that precious time the commander of the German Second Army (Frederic Charles) rode sixteen miles from the rear, and the 10th corps completed a march of twenty-eight miles since daylight. At its close both came upon the field, renewed the action, and held their position against greatly superior numbers. In a battle where the total losses run to 16,000 on a side, to achieve any such result as this the lives of 500 men and the services of a brigade of cavalry are a very cheap price. But the question is, will such a sacrifice always accomplish such a result?

This seems far from likely. It is more probable that the result, as at Woerth, will be nil. At that battle the Prussian infantry simply kept cool, knowing that the cavalry could not hurt them with breechloaders in their hands. Nor is it likely that at Vionville the Prussian cavalry really did any material damage to the French; but the latter seem to have been bound by the old traditions and to have retained the old fear of a cavalry charge. There can be no doubt that this charge produced a tremendous moral effect upon the French, the advantages of which more than repaid the sacrifice.

In general, therefore, it may be said that the employment of cavalry on the battlefield in presence of breechloaders is still an open question. Its use will involve losses amounting almost to destruction, but at certain critical moments, against infantry which does not fully realize the power of its new musket, it may accomplish great results.

But the great role of cavalry now-a-days is not in battle. Unlike artillery and infantry, which accomplish nothing positive except when fighting, cavalry is most useful in the intervals between battles. It is the eyes and ears of an army, or, as has often been said, it is the *antennae*, or feelers, of the great military insect; always keeping the touch of its antagonist, falling back before him, advancing after him, always in sight of him, concealing from him the body of the insect as it crawls along. This function cavalry has performed from time immemorial, but never before to the same extent as in our Civil War and in 1870. In 1866 and in 1877 it was less efficiently performed.

The services rendered in this manner to the German army by its cavalry in 1870 were of inestimable value. From the first skirmishes on the Saar to the surrender at Sedan it seems never to have lost the touch of the enemy. It was not only in front, but on the flanks; sometimes half a march and sometimes two and three marches ahead, but always in contact and observation of the French. The only novelty in this performance, apart from its excellence, was the self-reliance shown by the cavalry, which did not fear to act far beyond the reach of the infantry. It is not impossible that this independence was in some measure the result of a study of the action of cavalry in our Civil War—although this has never been acknowledged—for the Prussian cavalry did not so act in 1866. The official account tells us that the two armies stumbled on each other the day before the battle of Königgratz, "without either army suspecting the near and concentrated presence of the other."[28] It was the same with the Russians in 1877, who constantly lost sight of the Turks, and with the French in 1870. In all these cases the cavalry acted upon the old ideas of keeping close to the infantry, and relying upon it for support. Opposed to the more energetic action of the Prussians, the French cavalry in 1870 accomplished almost nothing, and the army com-

manders were constantly in the dark as to position and movements of their adversaries.

It is well to notice the organization by which the Prussians achieved such material results. To each of the Prussian infantry divisions was attached a regiment (four squadrons—500 men) of cavalry; and in addition to these there was a division of six regiments attached to the Guard corps, and six other divisions (1st to 6th) averaging six regiments each, under the orders of the army commander alone. The regiments attached to the divisions of infantry remained in proximity to their divisions and felt for their respective divisions alone; the cavalry divisions operated on a larger scale for the benefit of the whole army.

The French cavalry, nearly but not quite so numerous in proportion to the infantry as the Germans, was organized differently. To each army corps and under the orders of the corps commander was attached a division of cavalry of four or six regiments, leaving only twelve regiments in all for what was called the "cavalry reserve," *i. e.*, the cavalry under the orders of the army commander.

The Russians had this same organization in 1877.

There can be but little doubt that the organization of independent divisions or corps of cavalry, subject to the direct orders of the army commander, as in our Civil War and in the German army, is by far the most efficient manner in which to use cavalry. The assignment of one regiment to every 10,000 infantry, to always act with it, is, however, of great importance. It will be remembered that during the Gettysburg campaign Lee's cavalry, all united under Stuart, while attempting to harass the Union army at the crossing of the Potomac, became separated from Lee, leaving him near Chambersburg with no cavalry to feel for the enemy on his right flank, and entirely ignorant of Meade's movements.

Two other uses of cavalry, fully equal in importance to that of feeling the enemy, found their origin and their full development in our Civil War. These were, first, the employment of large bodies of troopers in independent "raids," sweeping entirely around the enemy's army and destroying his communications and supplies; and second, their employment as mounted infantry, fighting on foot in battle, then mounting their horses in pursuit.

These were among the most prominent characteristics of the war, and they are so well known and understood that it is not necessary to describe them in detail. The operations of Forrest and Morgan against Buell's communications in Tennessee and Kentucky, in July, 1862, and against Rosencrans, in November of the same year; the raid of Stuart, riding through Pennsylvania, completely around McClellan's army, after the battle of Antietam; Kilpatricks's raid against Richmond, and Grierson's raid through Mississippi, in the winter of 1864-65—all these movements

are well-known. In them, undoubtedly, the cavalry lost a great deal in horses, but the damage it did in destroying the enemy's supplies and communications was more than an equivalent.

The greatest achievements of this character took place in the spring of 1865, when Grant directed Sheridan, with 10,000 troopers, to move across from the Shenandoah Valley to Richmond; Wilson, with 12,500, to leave the Tennessee River at Eastport, Mississippi, and penetrate through the heart of Alabama and Georgia; and Stoneman, with 5,000, to move from the valley of East Tennessee against the railroads near Lynchburg.

Sheridan left Winchester on the 27th of February, and arrived at White House, on the Pamunkey, on the 19th of March. On his way he destroyed the James River Canal and the Virginia Central Railroad, so as to preclude all possibility of Lee's retreating towards Lynchburg by the north bank of the James.

Stoneman did not get started until the 20th of March, but he soon reached the vicinity of Lynchburg, destroying the railroads, so that Lee could not retreat through that point, could he even have reached it by the roads south of the James. Thence turning South, he operated on the rear of Johnston's army, destroying all his communications towards the West.

Wilson started on the 22d of March, and marching 525 miles in twenty-eight days, "captured 6,200 prisoners, 280 pieces of artillery, 99,000 stand of small arms, and whatever else of military advantage was left in the State of Alabama."[39]

These three independent expeditions of cavalry captured nearly their own number of prisoners, and destroyed an enormous amount of supplies; and two of them had a direct military importance in preventing Lee's retreat towards Tennessee.

They realized Grant's expectation of "eating out the vitals of the South, and leaving nothing for the rebellion to stand upon."

Space does not permit anything more than a reference to the great services rendered by Sheridan's cavalry, dismounted, at Five Forks, and of Wilson's at the battle of Nashville, nor to recount the brilliant action of the cavalry between Five Forks and Appomattox.

The three European wars of the period under consideration are conspicuous by the absence of any such independent cavalry movements as those just referred to. Yet each of these wars afforded admirable opportunities for such expeditions.

In 1866, the Austrian cavalry, by cutting the communications of the Prussians after the battle of Königgratz, might very possibly have brought the Prussian advance to a stand still, and gained time to fight another battle north of Vienna. In 1877, the Russian cavalry, if boldly handled,

might have cut off Osman's supplies in September, and caused the surrender of Plevna in October, instead of December; on the other flank it might have destroyed the Rustchuk-Varna railroad, and have compelled the abandonment of the former place. And more than all, in 1870, after the battle of August 16th and 18th, instead of taking his 15,000 cavalry into Metz, there to eat off their heads, Bazaine might have sent them out by the valley of the Moselle, while it was still open on the South, thence to turn to the East and South, cutting the railroad communications of all three of the German armies, and finally escape to Paris or the South of France, according to circumstances. This would have been a bold enterprise, and at some time during its progress it would have involved a severe contest with possibly equal numbers of German cavalry, who would have rushed to meet them by a short interior line. But, if successful, it would have produced delays in the German movements, which, perhaps, might have changed the whole campaign. Judging by the achievements of the Civil War, it would not have been an impossible feat if entrusted to a Sheridan. Even if destroyed, the cavalry would have had a more enviable and useful fate than that which actually befel them cooped up within the walls of Metz.

ARTILLERY.

The introduction of breechloading muskets and the substitution of long range rifle cannon for the smooth-bore Napoleons has brought about a very considerable change in the manner of employing artillery. The former ideas on the subject may be illustrated by two quotations from Mahan.[30] "In the defensive the principal part is usually assigned to the artillery, and the positions taken up by the other arms will, therefore, be subordinate to those of this arm." * * * * "The collection of a large number of pieces in a single battery is a dangerous arrangement, particularly at the outset of an engagement." Both of these statements are in direct opposition to present practice; artillery does not now play the principal part in the defensive; its greatest use is on the offensive, and, especially, to prepare the attack; and its action can only be fully developed by concentration in great masses. Its former employment against columns of attack has now no existence, because attacks are no longer made in columns, but in open order; dispersed lines afford a very poor target for artillery, and its action against them (with shells) is insignificant compared with the effect produced by a hail of bullets. Artillery, therefore, now acts, 1st, on the offensive, to prepare the attack by inflicting material damage upon, and shaking the *morale* of, troops occupying a strong position for defence. For this purpose it should advance as far to the front as is possible without sacrificing its horses, and should take part in the beginning of the battle. 2d, on the defensive, by endeavoring to silence the enemy's

batteries and prevent them from aiding in an attack. Little or none of it should be kept in reserve, for it is all needed at the opening of the battle.

The Civil War is not fruitful of lessons in regard to the use of artillery. This is largely accounted for by the topographical nature of the battlefields, which, in general, was not favorable to its employment. It was constantly used "to shell the enemy out of the woods," but it does not appear to have had a decisive influence upon any single battle. In only one battle was it used in large masses, viz., at Gettysburg. Longstreet endeavored to prepare his grand attack by the fire of 145 guns posted on Seminary Ridge. They seem to have done very little harm, as the Union troops were sheltered by walls and temporary intrenchments. They were answered by eighty guns, which partly reserved their fire until the enemy's infantry advanced, when they poured shot and shell and canister into their ranks, but did not stop their advance at all. The assault was defeated by the infantry, and it does not appear that the artillery on either side contributed in any degree to the result.

The majority of the battles in the war in Turkey tell the same story. At Plevna the Russians had a well appointed artillery, nearly five times as numerous as that of the Turks. It was used in large masses, and prior to the battle of September 11th it bombarded the Turkish positions for four days, but produced no effect upon them. It should be remembered, however, that these positions were fortified by redoubts and trenches of very strong profile, amply provided with bomb-proof shelters.

At Lovtcha, on the other hand, where the Turkish position was not so thoroughly fortified, the artillery played a most important part. It cannonaded the Turkish positions for eight hours, and with such effect that the infantry assault was entirely successful and was comparatively of short duration.

At Telis the artillery, using shrapnel, caused the surrender of a redoubt containing 3,000 men, without an infantry assault. These were the only battles of the war, however, in which artillery did have a decisive effect.

In 1866 the artillery was not used with skill on either side, but in 1870 the Germans made such use of it that the French were disposed to ascribe their defeats almost wholly to it. They used it invariably in the manner above described, *i. e.*, early in the action, advanced well to the front, in two or three large groups, so disposed as to bring a converging fire. At Woerth, by 10.30 A.M., the 5th corps had all its artillery (eighty-four pieces) in position, with twenty-four pieces of the 11th corps on its left; and there were 200 pieces in action when the main attack took place in the afternoon. Similarly at Vionville the 3d corps and one brigade of the 10th, which carried on the battle unaided till 4 P.M., had all their artil-

lery (120 pieces) in position before noon, disposed in four groups of thirty pieces each ; and when the 10th corps came up on their left at Mars-la-Tour, at 4 P.M., the artillery of the right flank was massed in one line of 108 pieces. Again, on the 18th, the artillery of the right flank was concentrated in one group of 132 pieces in front of Gravelotte ; in front of Amanvilliers the entire artillery of the 9th corps was pushed dangerously to the front and fully engaged long before the attack of the infantry. The attack of the 12th corps on St. Marie aux Chênes was also preceded by its fourteen batteries coming into action at 1,200 yards; and finally, to prepare the grand effort of the Guards and Saxons against St. Privat, which decided the battle, no less than 180 pieces were brought into play in three groups of seventy-two, seventy-two and thirty-six pieces each, so disposed as to bring a converging fire upon the village. At that time, 5 P.M., there were about 400 guns in action along a line eight miles in extent.

The attack on St. Privat[21]—a fortified village of stone houses, with slight intrenchments on its flanks, the whole forming the key to the French position—is especially interesting with reference to the use of artillery. The 180 guns previously referred to had been firing upon it for about a half hour, when the commander of the Guard thought it necessary to begin the assault. This assault was made by fifteen battalions of the Guard, numbering in all about 12,000 men. They advanced in a line of half-battalion columns, covering a front of about 2,000 yards ; they came under fire at 2,000 yards from St. Privat, and continued their advance until within 800 yards; beyond this point they were unable to go, and in the fifteen minutes they were under fire they had lost 5,000 men.

They clung to the position they had gained, and fortunately the French did not make a counter attack. The Germans then advanced the 12th corps on their left, taking the village of Roncourt and then moving on St. Privat from the north. This corps also came within about 800 yards of the village, but could get no further. The Germans then brought up their artillery, placing fourteen batteries of the 12th corps in a line running southwest from Roncourt, and ten batteries of the Guard just south of the high road running west from St. Privat, the average distance of the batteries from St. Privat being 1,200 yards. There 144 guns then opened a furious fire upon St. Privat, battering down its walls and setting fire to the houses, and under cover of this cannonade, about 7:15 P.M., both the Saxons and the Guards again moved forward to the assault, and this time with entire success.

The first assault was made too soon, the artillery not having completed its work ; and the second assault owed its success to this mass of artillery moving up to the very front of the battle, and by its concentrated fire rendering the French position untenable.

During the war of 1877 the only success achieved by the artillery was in using shrapnel; and since that war the proportion of shrapnel has been largely increased in the artillery ammunition of the Continental armies. The form of the shell has also been changed since the war of 1870, and instead of having a solid body it is now made of two cylindrical walls; the outer one solid, but very thin, and the inner one composed of segmental rings placed on top of each other; the result being that it bursts into a much larger number of pieces than with a solid wall. With this segmental shell and with a free use of shrapnel it is probable that in another war artillery used in large masses will produce a great effect against even a dispersed line; and that it will regain its relative importance to infantry, which it lost just after the introduction of quick-loading muskets.

The organization of artillery best adapted to achieve the greatest results with its fire is that adopted in the German army. In that organization the artillery of a corps forms a regiment, and is divided into three *Abtheilungs*, or parts, each consisting of four batteries. One *Abtheilung* is attached to each division, and the third *Abtheilung* is subject to the orders of the corps commander. Each cavalry division has two horse batteries attached to it.

ENGINEERS.

A very considerable change has taken place since the Crimean War in the part played by fortifications in a campaign.

1st, Temporary fortifications on the field of battle have come to the first rank in importance.

2d, Permanent fortifications have less influence than they formerly had.

3d, Earthworks of strong profile, forming large intrenched camps, have to some extent supplanted the permanent fortifications.

It was the genius of Todleben at Sevastopol which first brought to the attention of the world the new use of fortifications; and the principles there established were still further exemplified at Washington, Richmond, Vicksburg and Plevna. It is not meant by this that permanent fortifications have no longer any value; they have the same value that they always had in furnishing great depots and rallying points for defence, and in preventing the enemy from seizing the important strategic points where they are situated. But the enemy acts against them in a different manner from that pursued in the last century. Instead of laying siege and taking the fortress on the thirty-seventh night, according to rule, the invader now penetrates between the fortresses, detaching a force to observe their garrisons and prevent them from coming forth. With the bulk of his army he passes on, aiming to meet the defender's army in the open field or to reach his capital. His plan of

action is determined by these fortresses, and he must carefully provide for masking them in order to keep his communications secure. But the novelty of the last thirty years has been the construction, after the campaign opens, of new fortifications which were not provided for in the plan of campaign, and which completely derange it.

These changes are most clearly illustrated by comparing the last war between Russia and Turkey with the numerous wars previously waged between those Powers. The quadrilateral of fortresses (Rustchuk, Shumla, Varna, Silistria) has long been the stronghold of Turkey's defence. In previous wars the operations of the invaders have always been directed to the siege of these places, and with their capture the campaign has terminated. In 1877 the existence of these fortifications prevented the Russians from advancing on the direct line near the sea coast. But, instead of besieging the fortresses, their plan of campaign was to make a détour to the west of them, leaving a force to observe and neutralise them, while the main body advanced over the Balkans. No sooner, however, had the Russians crossed the Danube in their advance than the Turks seized a little village on the opposite flank of the Russians, and spading away with all their might, they soon had what was virtually a fortress on that flank. This had not been provided for, and it deranged the whole plan of the Russians for five months, until, after several unsuccessful assaults, it was starved out and taken. But for the prompt and bold decision of the Russians to cross the Balkans in the dead of winter, and the sturdy character of their soldiers, which made such a movement possible, the fortifications of Plevna (aided by diplomatic interference) would have brought the Russian invasion to naught.

This case also illustrates the limitation of this system of sudden fortification. Such places are necessarily unprovided with magazines and stores for a long siege, and once they are closely invested their inevitable fate is starvation and surrender. They should therefore be used only so long as their communications can be kept open, and then abandoned for similar places in their rear and nearer their base.

This subject belongs more properly to the domain of strategy than of tactics, though, as already said, the line between the two subjects is often hard to strictly define.

On the battlefield great use has been made of the various mechanical devices which have been invented or brought to perfection during the last two decades. Most prominent among these are the uses of the field telegraph, and of signalling by flags and torches, for communicating intelligence, and of balloons for observing the enemy; also the use in the field of the processes of lithography and photography for quickly reproducing copies of maps of hasty surveys and reconnaisances.

Signalling by flags and torches has been confined almost exclusively

to our own army. The manner in which the garrison of Alatoona was saved in October, 1864, by signalling over the heads of the enemy, is known to every one. A similar opportunity for saving a large part of the losses in Skobeleff's command existed at the battle of Plevna, but it was not taken advantage of, for the Russians had no system of signalling.

The war of 1877 afforded a most striking instance of the use of a telegraph wire on the field of battle. At the battle of Aladja Dagh (near Kars), the Russian plan was to assault the Turkish fortified position in front with a force of about 30,000 men, while a turning column of 15,000 men was to make a complete détour of more than forty miles through a mountainous country, passing far beyond the Turkish right flank and striking the centre of their rear. Such operations are known to be among the most difficult in war, and unless the attacks are simultaneous on both sides they are usually unsuccessful. The telegraph gives a means of making the attacks simultaneous; and in this case the turning column spun out a thread of wire behind it, by means of which it remained in full and constant communication with the main body. The attacks were made simultaneously, and they absolutely destroyed the Turkish army. Its defeat made possible the storm of Kars, and sealed the fate of the campaign in Asia Minor.

This was almost exactly a parallel case to that of Sherman's main army at Tunnel Hill, and McPherson's detachment at Resaca. McPherson was about twenty miles from Sherman, and communication was kept up by couriers, who took from 5 P.M. till "during the night" to carry McPherson's despatch of May 9th stating his position. Had there been communication by telegraph, delivering messages of any desired length in a few minutes, McPherson could have reported fully on the afternoon of the 9th, and asked for explicit orders in place of the discretionary ones with which he had previously been furnished. In that case he would not have missed "such an opportunity as does not occur twice in a single life," and Johnston's army might have been destroyed then and there, instead of remaining to torment its enemy for seven months longer, until Thomas finally destroyed it at Nashville.

In the employment of engineer troops no radical change has been made in the last twenty years. As already indicated, they have imparted to the army at large one of their most important functions (field-fortification), but their services will still be required to supervise the construction of these works and to select proper sites for them. The amount of bridge building, corduroying and pioneer work performed by engineer troops during the Civil War was unprecedented in extent and in the rapidity with which it was accomplished; but there were no new principles involved in it. In the war of 1877 companies of mounted pioneers were formed and found very useful, and it is likely that they will be employed in future wars.

CONCLUSION.

As stated at the beginning of this essay, the twenty years under consideration have seen changes in the art of war far surpassing in importance the changes wrought in an equal space of time at any previous period of the world's history.

The most important of them may be briefly summarized as follows:

1st, Changes in organization, by which only a portion of the army is kept in the ranks in time of peace, and by which large bodies can be placed in the field with extraordinary celerity on the outbreak of war.

2d. The uses of steam and electricity, by which troops can be transported with marvellous rapidity, and combined operations carried on successfully over a large territory.

3d, The universal use of intrenchments on the battlefield, and the great improvements in firearms, from which have resulted,

(*a*) the necessity of attacking by infantry in dispersed order by means of its fire, instead of in column by means of its momentum or shock;

(*b*) the danger of destruction to cavalry if used on the battlefield against infantry;

(*c*) the necessity of using artillery in large masses in the early part of the action and with a projectile which breaks into a vast number of pieces, so as to do damage over a large space.

4th, The use of cavalry as mounted infantry, fighting on foot and moving on horseback, in independent expeditions against an enemy's communications.

The effect of these improvements upon future operations can hardly be stated in a word; but generally speaking it will be to enable a great commander to accomplish in a month what formerly required a year, and to make still wider the gulf between a great commander and an incompetent one, for any improvement in the tools of a trade inures to the benefit of the most skilful workman.

War is, above all things, an art, employing science in all its branches as its servant, but depending first and chiefly upon the skill of the artisan. It has its own rules, but not one of them is rigid and invariable. As new implements are devised new methods result in its mechanical execution; but over and above all its mechanical appliances it rests upon the complex factors of human nature, which cannot be reduced to formulas and rules. The proper use of these thinking and animate parts of the great machine can be divined only by the genius and instinct of the commanders. No books can teach this, and no rules define it.

NEMO.

APPENDIX.

NOTES AND AUTHORITIES.

[1] This division of the subject is, of course, open to criticism.

Nearly all writers on the art of war follow the lead of Jomini, the first sentence of whose "Summary of the Art of War" is as follows:

"The art of war, as generally considered, consists of five purely military branches, viz.: Strategy, Grand Tactics, Logistics, Engineering, and Tactics."

In the conclusion of the same great work, however, Jomini says (p. 322): "Strategy is the art of bringing the greatest part of the forces of an army upon the important point of the theatre of war or zone of operations.

"Tactics is the art of using these masses at the points to which they shall have been conducted by well arranged marches."

I have followed his latter division as being the more comprehensive; and it is evident that Logistics is a mere factor in the problems of strategy, that Grand Tactics and Minor Tactics are only branches of one and the same subject, and that Engineering is a mere accessory, now in strategical, now in tactical problems.

The natural order of sequence in war is:

First.—To prepare an army.

Second.—To lead it to the battlefield.

Third.—To fight it.

All military problems are comprised within one of these three classes of operations, though they may merge into each other by such imperceptible gradations that it is often difficult to draw the line between them.

[2] In Hozier's "Seven Weeks' War," pp. 77 to 85, there is a very interesting sketch of the changes in the Prussian Army from 1807 to 1866.

Space limits us to the following extract: "The terms of peace dictated by Napoleon after the Jena campaign allowed the Prussian Army to consist of only 42,000 men, but no stipulation was made as to how long these men should serve. In order to secure the means of striking for independence on the first favorable opportunity, General Scharnhost introduced the *Krümper* system, by which a certain number of soldiers were always allowed to go home on furlough after a few months' service, and recruits were brought into the ranks in their place. Those drilled were in their turn sent away on furlough and other recruits brought in for training. * * * * Thus, in 1813, Prussia possessed an army of 250,000 men, of whom 170,000 were ready to take the field, while the remaining 80,000 formed reserve and depot troops, and supplied garrisons. This army fought in the war of independence, and formed the first nucleus of the existing military organization of the kingdom—an organization which, dating from a terrible misfortune, the bitter experience of which has never been forgatten, has since been constantly tended, improved, and reformed, and with careful progress been brought to such

a high pitch of excellence that last year (1866) it enabled the Prussian troops to march and conquer, with an almost miraculous rapidity, to eclipse in a few days the glories of the Seven Years' War, to efface the memory of Jena by thundering on the attention of the startled world the suddenly decisive victory of Sadowa, and to spring over the ashes of Chlum into very possibly the foremost place among the armies of the world."

NOTE 3.

ORGANIZATION OF THE PRINCIPAL ARMIES OF EUROPE.

STATE.	Population.	Expenditure.	Years of Service.				Army maintained in Peace.	Possible Strength in Time of War.			
			In the Ranks.	In the Reserve.	In the Landwehr.	Total.		Field Army.	Depot Troops.	Garrison Troops.	Total.
Germany	41,000,000	$77,000,000	3	4	5	12	400,000	680,000	240,000	330,000	1,250,000
France	36,000,000	$90,000,000	5	4	11	20*	450,000	780,000	270,000	500,000	1,550,000
Russia	82,000,000	$107,000,000	6	9	5	20	750,000	850,000	150,000	300,000	1,300,000
Austria	36,000,000	$52,000,000	3	7	2	12†	275,000	600,000	150,000	220,000	970,000
Italy	27,000,000	$37,000,000	3	5	11	19	218,000	375,000	125,000	250,000	750,000
England	32,000,000	$115,000,000	6	6	.	12	190,000	225,000	95,000	350,000	670,000

* 5 years in the Armée Territoriale, and 6 years in the Réserve de l'Armée Territoriale.

† 4 years in the Milizia Mobile, and 7 years in the Milizia Communale.

The figures in the above table are taken from the Encyclopædia Britannica (1879), and are approximate only.

[4] "The English Army," by Major Arthur Griffiths, p. 372; also Chapters XII. and XIII.

[5] "Journal of the Military Service Institution of the United States." Vol. 2, pp. 229 et seq.

The original data from which this article was compiled will be found in various parts of the Report of the Secretary of War, 1865-66.

[6] Annual Report of the Secretary of War, 1865, p. 6 and p. 14.

Quoted in Badeau's "Life of Grant," Vol. 2, p. 555.

[7] The number of men on the field of Sadowa is given in the Prussian Official History of the War of 1866 (English translation, p. 187) at 220,984 actually engaged, and 9,200 who arrived on the field at the close of the action. The strength of combatants alone in the active army on June 14th is given in the same work, page 32, at 326,000. In 1866 the Prussian Army was in a transition period, the law of 1860 (fixing the length of service at three years in the ranks and four years on furlough) requiring seven years for its full development. A full account of this transition is given in Baron Stoffel's Reports (English Translation, p. 25). According to Hozier (p. 85), when the law of 1860

reached its full development in 1867, the peace strength of the Prussian Army was 217,000, and its full strength in war was:

Active army,	342,000
Depot troops,	130,000
Landwehr,	303,000
Total,	775,000

He states (p. 89) that in July "Prussia had over 600,000 men under arms."

[8] These figures are taken from the German Official History of the War of 1870 (English Translation, pp. 39 to 46).

[9] These figures are taken from "The Russian Army and its Campaigns in Turkey in 1877-78," p. 51.

[10] Annual Report of the Secretary of War, 1865-66, p. 36.

[11] Same Report, pp. 216 et seq.

[12] Same Report, pp. — et seq. (Report of Gen. D. C. McCallum, Superintendent of Military Railroads.)

[13] Prussian Official History of the War, 1866. (English translation, p. 24 and pp. 505, 507.)

[14] The figures here given are compiled from the narrative in the German History of the War of 1870 (English Translation, pp. 56 to 76). It does not, however, give a full account of this remarkable achievement in railroading, and I have never seen one in any other book. A partial account is to be found in Borbstaedet and Dwyer's "Franco-German War," pp. 194 and 229. The official account (p. 58) states that on single track lines twelve trains were forwarded in a day, and on double track lines eighteen trains; in the former case it required five and a half days, and in the latter three and a half days, to embark a corps of 30,000 men with all its material, the number of trains being 65. The railway material was so ample that (using the vehicles only once) but three-fifths of the carriages and two-fifths of the locomotives were called into use to move the first ten corps. This would indicate that more than 1,000 trains of forty cars each were available on the six roads.

[15] Annual Report of the Secretary of War for 1865, p. 491. (Report of Colonel Stager, Chief U. S. Military Telegraphs.)

NOTE 16.

LOSSES IN BATTLE—1745-1880.

BATTLE.	Date.	Numbers Engaged.		Killed and Wounded.			Authority.
		On each Side.	Total.	On each Side.	Total.	Per Cent.	
Friedberg	1745	70,000 Pr. 70,000 Au.	140,000	5,000 9,000	14,000	.10	Home. "Précis of Modern Tactics."
Prague	1757	64,000 Pr. 74,000 Au.	138,000	16,000 8,000	24,000	.17	Taken from "a paper in Royal Engineer Papers by Colonel Cooke, R. E."
Rossbach	1757	22,000 Pr. 55,000 Au.	77,000	500 2,800	3,300	.04	
Breslau	1757	25,000 Pr. 60,000 Au.	85,000	5,000 6,286	11,286	.13	do.
Lissa	1757	36,000 Pr. 80,000 Au.	116,000	5,000 6,574	11,574	.10	do.
Zorndorf	1758	32,000 Pr. 50,000 Ru.	82,000	11,385 21,531	33,916	.41	do.
Hochkirch	1758	80,000 Au. 30,000 Pr.	80,000	5,000 7,000	12,000	.15	do.
Marengo	1800	28,127 Fr. 30,850 Au.	58,977	7,000 6,800	13,800	.23	do.
Austerlitz	1805	90,000 Fr. 80,000 Allies	170,000	12,000 11,000	23,000	.14	do.
Jena	1806	100,000 Fr. 100,000 Pr.	200,000	14,000 20,000	34,000	.17	do.
Eylau	1807	85,000 Fr. 75,000 Ru.	160,000	30,000 25,000	55,000	.34	do.
Friedland	1807	80,000 Fr. 50,000 Ru.	130,000	10,000 17,000	27,000	.21	do.
Talavera	1809	52,000 Allies 50,000 Fr.	102,000	5,928 7,200	13,128	.13	do.
Wagram	1809	150,000 Fr. 130,000 Au.	280,000		24,000	.08	do.
Salamanca	1812	Eng. Fr.	90,000	8,000 22,800	30,800	.34	do.
Borodino	1812	125,000 Fr. 125,000 Ru.	250,000		80,000	.32	do.
Leipzig	1813	150,000 Fr. 280,000 Allies	430,000	50,000 60,000	110,000	.26	do.
Vittoria	1813	70,000 Allies 27,000 Fr.	97,000		10,000	.10	do.
Waterloo	1815	67,600 Allies 68,900 Fr.	136,500	14,000 30,000	44,000	.32	do.
Alma	1854	51,500 Allies 37,400 Ru.	88,900	3,300 5,700	9,000	.10	Rousset. "Guerre de Crimée."
Inkerman	1854	24,000 Allies 36,000 Ru.	60,000	3,300 9,138	12,438	.20	do.
Solferino	1859	135,234 Allies 163,124 Au.	298,358	14,415 13,020	27,435	.09	Home. "Précis of Tactics."
Shiloh	1862	58,000 U. S. 40,000 C. S.	98,000	9,900 9,700	19,600	.20	Force. "Fort Henry to Corinth."
Manassas	1862	55,000 U. S. 54,000 C. S.	109,000	9,000 7,250	16,250	.15	Ropes. "The Army under Pope."
Antietam	1862	70,000 U. S. 40,000 C. S.	110,000	11,400 11,000*	22,400	.20	Palfrey. "Antietam & Fredericksburg."

NOTE 16—Continued.

BATTLE.	Date.	Numbers Engaged.		Killed and Wounded.			Authority.
		On each Side.	Total.	On each Side.	Total.	Per Cent.	
Fredericksburg...	1862	113,000 U. S. 78,000 C. S.	191,000	10,200 5,000	15,200	.08	Palfrey. "Antietam & Fredericksburg."
Chancellorsville..	1863	120,000 U. S. 60,000 C. S.	180,000	11,200 10,009	21,200	.12	Swinton. "Army of the Potomac."
Gettysburg.....	1863	72,000 U. S. 76,000 C. S.	148,000	16,500 22,000*	38,500	.26	Bates. "The Battle of Gettysburg."
Chattanooga.....	1863	60,000 U. S. 45,000 C. S.	105,000	5,300 3,000	8,300	.08	Badeau. "Military History of U. S. Grant."
Wilderness.....	1864	117,000 U. S. 75,000 C. S.	192,000	11,000 10,000*	21,000	.11	do.
Spottsylvania....	1864	105,000 U. S. 62,000 C. S.	167,000	11,600 10,000*	21,600	.13	do.
Cold Harbor.....	1864	110,000 U. S. 75,000 C. S.	785,000	8,500 5,000*	13,500	.08	do.
Nashville.....	1864	54,000 U. S. 33,000 C. S.	87,000	7,500 5,000*	12,500	.14	do.
Königgratz.....	1866	230,000 Pr. 206,000 Au.	436,000	8,884 18,781	27,665	.06	Prussian Official History.
Wörth.....	1870	90,000 Ger. 45,000 Fr.	135,000	9,269 7,000*	16,269	.12	German Official History.
Spicheren.....	1870	41,800 Ger. 38,000 Fr.	79,800	4,500 2,982	7,482	.09	do.
Colombey.....	1870	75,553 Ger. 65,000 Fr.	140,553	4,779 3,608	8,387	.06	do.
Mars la-Tour.....	1870	87,257 Ger. 140,000 Fr.	227,257	14,832 16,000	30,832	.14	do.
Gravelotte.....	1870	233,432 Ger. 135,000 Fr.	368,442	19,677 12,000	31,677	.09	do.
Sedan.....	1870	188,000 Ger. 124,000 Fr.	312,000	8,030 17,000	25,030	.08	do.
Shipka.....	1877	30,000 Ru. 28,000 Tu.	58,000	3,600 10,000*	13,600	.23	Russian Official Reports.
Plevna, July 30..	1877	30,000 Ru. 40,000 Tu.	70,000	7,305 5,500	12,805	.18	do.
Plevna, Sept. 11..	1877	84,000 Ru. 56,000 Tu.	140,000	18,581 12,000	30,581	.22	do.
Plevna, Dec. 10..	1877	110,000 Ru. 43,000 Tu.	153,000	1,729 4,000	5,729	.04	do.
Shenova, Jan. 9..	1878	56,000 Ru. 36,000 Tu.	91,000	5,484 3,000	8,484	.09	do.

*Estimated.

SUMMARY.

WARS.	Total Engaged.	Total Losses.	Per Cent.
Wars of Frederick, 1745–1758	738,000	110,000	.15
Wars of Napoleon, 1800–1815	2,104,000	464,700	.22
Crimea, 1854	149,000	21,400	.15
Italy, 1859	298,000	27,400	.09
United States, 1861–1865	1,572,000	210,000	.13
Austria, 1866	436,000	27,600	.06
France, 1870	1,263,000	119,700	.09
Turkey, 1877	512,000	71,200	.14
Totals	7,072,000	1,052,000	.15

[17] "Précis of Modern Tactics," by Robert Home, Major R. E., Colonel and Asst. Qr. M. Gen., London, 1878, (p. 71.) I beg to acknowledge the constant use made of this admirable work throughout the whole of the tactical part of this essay. It makes hardly any reference to the Civil War, but its discussion of the tactical features of recent wars in Europe is unrivalled by any book that I know of.

[18] Jomini. "Art of War." Mendell and Craighill's translation, pp. 290–300.

Jomini says, "There are, in fact, only five methods of forming troops to attack an enemy:

"*First.*—As skirmishers.

"*Second.*—In deployed lines, either continuous or checkerwise.

"*Third.*—In lines of battalions formed in column on the central division.

"*Fourth.*—In deep masses.

"*Fifth.*—In small squares.

"The skirmishing order is an accessory; for the duty of skirmishers are not to form the line of battle, but to cover it by taking advantage of the ground; to protect the movements of columns, to fill up intervals, and to defend the skirts of a position.

"These different manners of formation are therefore reducible to four:

"The shallow order, where the line is formed in three ranks (fig. 1).

"The half deep order, formed of a line of battalions in columns doubled on the centre, or in battalion squares (fig. 2).

"The mixed order, where regiments are partly in line and partly in column (fig. 3;) finally,

"The deep order, composed of heavy columns of battalions deployed one behind the other" (fig. 4).

Jomini gives his preference for the "half-deep order" (line of double columns on the centre), and states that the use of the deep formation by the French at Waterloo was one of the causes of their defeat; and that MacDonald's column at Wagram succeeded only at a fearful sacrifice of life and by the help of the successes of Davoust and Oudinot. MacDonald's formation is shown in Fig. 5.

FIG. 1.
12 Battalions in deployed lines.

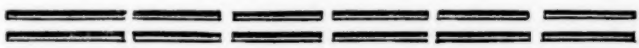


FIG. 2.
12 Battalions in double columns.

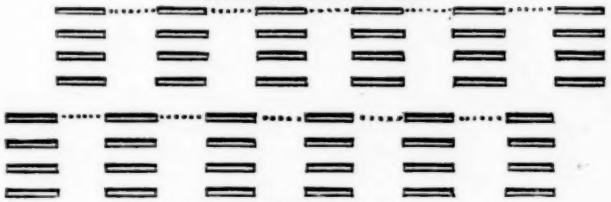


FIG. 3.
12 Battalions, 4 in line, 8 in columns.

FIG. 4.

12 Battalions in deep column.

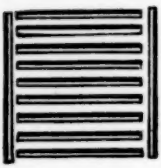
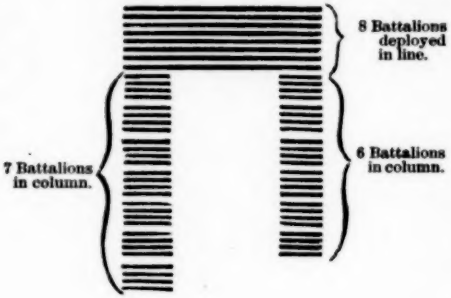


FIG. 5.

MacDonald at Wagram—21 Battalions.

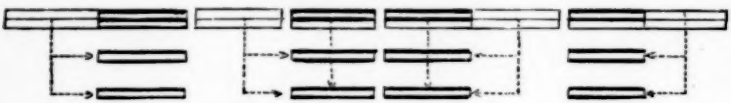


[19] Prussian Official History of the War of 1866. English translation, p. 171.

[20] The company column formation is described at length in Upton's "Armies of Asia and Europe," pp. 250–317.

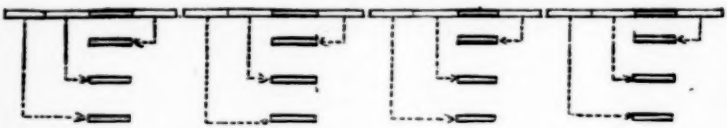
In Germany the battalion consists of four companies, each composed of two platoons, and it is formed in three ranks. Being in line the battalion is ployed into company columns by the first and second ranks of alternate platoons standing fast, and the first and second ranks of adjacent platoons moving to the rear and left (or right); the third ranks move to the rear, forming a third platoon.

GERMAN COMPANY COLUMNS.



In France the battalion is formed in two ranks, and consists of four companies of four platoons each. Company columns are formed on the second platoon, which stands fast, the first moving to left and rear, and the third and fourth moving to right and rear.

FRENCH COMPANY COLUMNS.



The company column is also formed on a front of two platoons (second and third in front.)

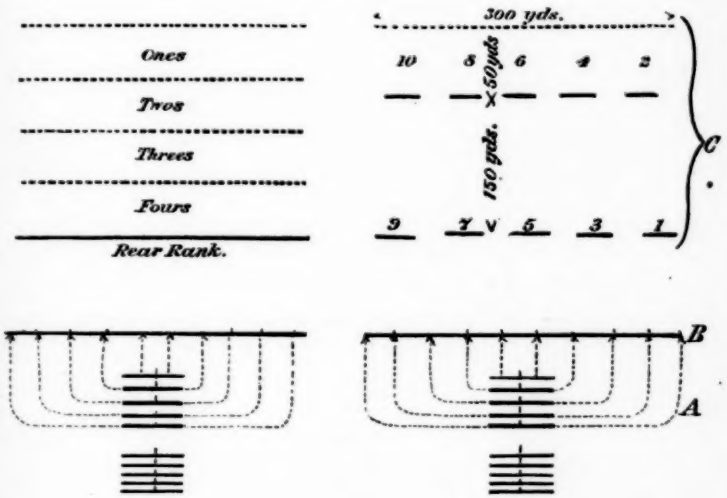
In Russia, Austria and Italy the company column does not materially differ from that in France.

NOTE 21.

DEPLOYMENT OF FOUR BATTALIONS FROM DOUBLE COLUMNS INTO LINES OF SKIRMISHERS AND SUPPORTS.

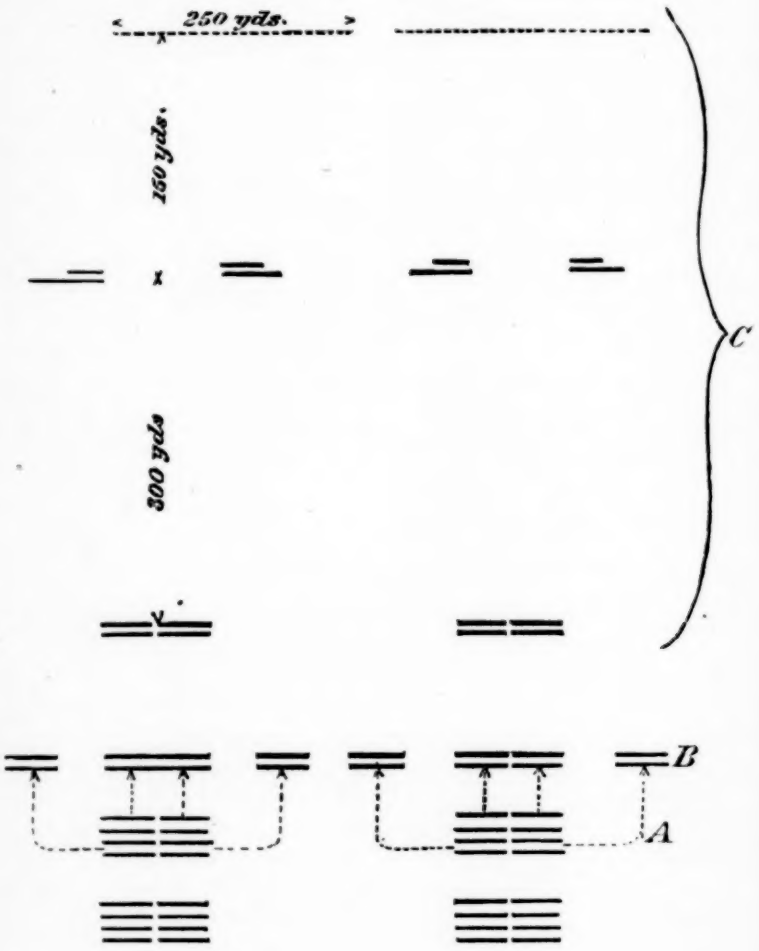
A—Double columns.
B—Line of two ranks, or of company columns.
C—Skirmishers and supports.

AMERICAN TACTICS.



NOTE 21—Continued.

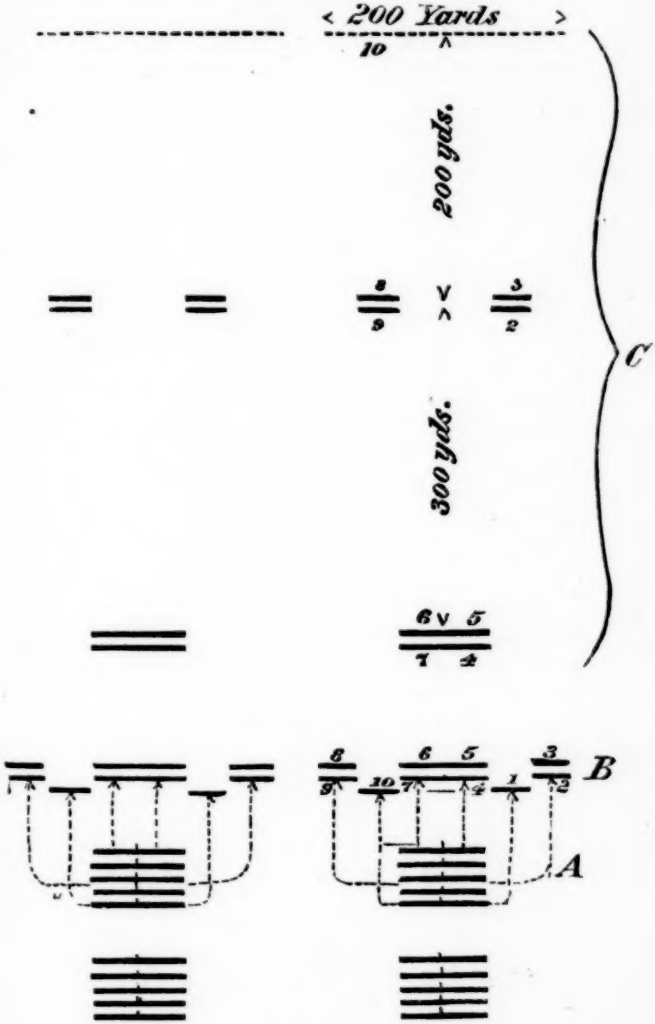
EUROPEAN TACTICS.



NOTE 22.

PROPOSED COMPANY COLUMNS FOR A TEN COMPANY BATTALION.

A—Double columns.
B—Line of company columns.
C—Lines of skirmishers and supports.

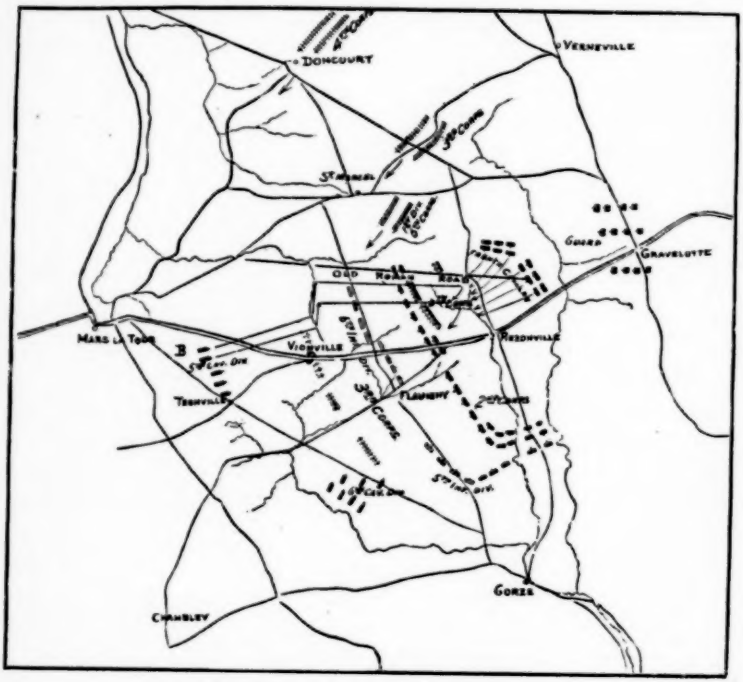


[23] Mahan. "Outpost," etc., p. 45.

NOTE 24.

VIONVILLE.

AUGUST 16, 1870.



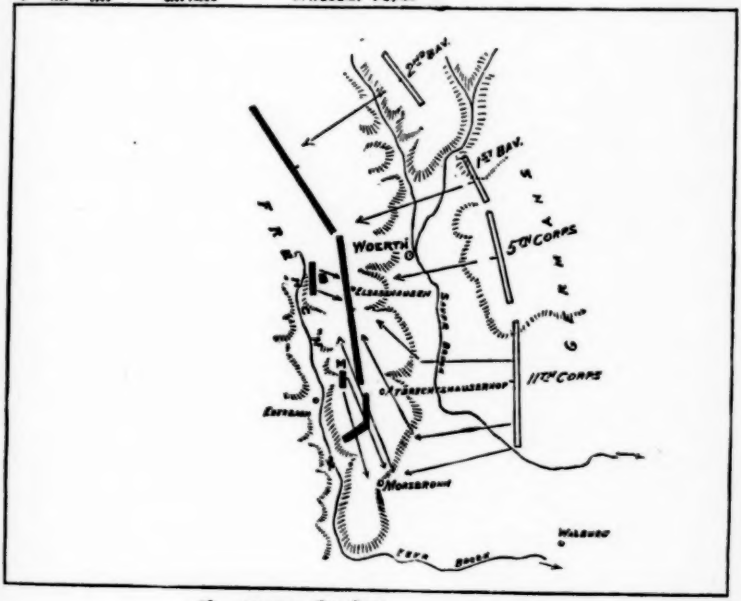
B. BREDOWS CAVALRY BRIGADE.

[25] German Official History of the War of 1870. French translation, Part 1, pp. 252, 255, 266, 267.

NOTE 26.

WOERTH.

6. AUGUST 1870.



M. MICHEL'S CAV. BRIG.
B. BOMMSHAIN'S CAV. DIV.

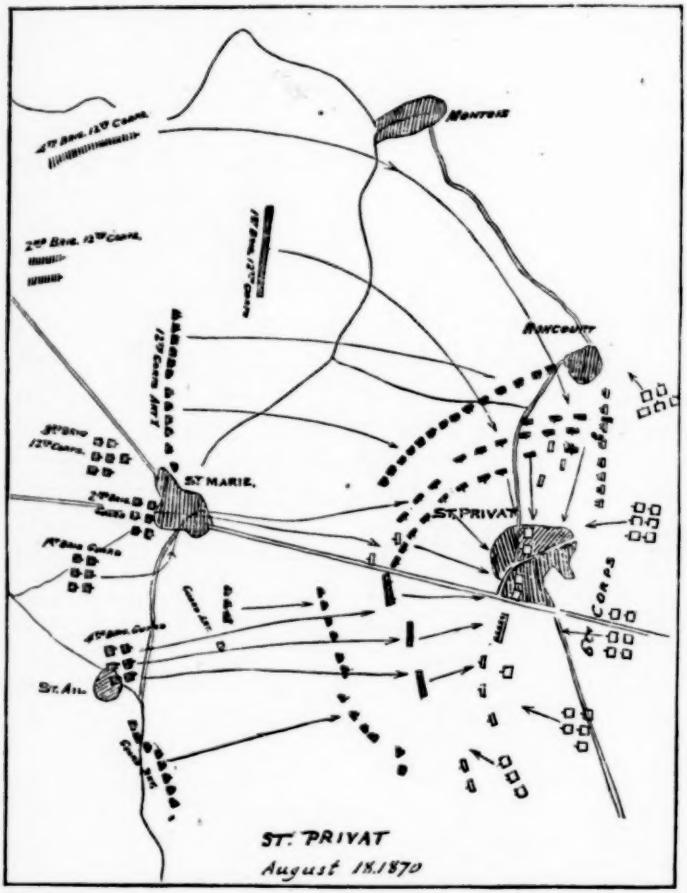
[27] Same, pp. 562-563.

[28] Prussian Official History of the War of 1866. English translation, p. 161.

[29] Badeau. "Military History of U. S. Grant," Vol. III., p. 638.

[30] Mahan. "Outpost," etc., p. 61.

NOTE 31.


MONTOIS
RANCOURT
ST MARIE.
ST. PRIVAT
ST. PRIVAT
August 18.1870
SCALE 1/4 25000
1 MILES.
Positions at 5 P. M. German French
Positions at 7.15 P. M. German

A MANUAL OF DRILL AND TACTICS.

BY LIEUTENANT G. N. WHISTLER,

FIFTH U. S. ARTILLERY.

I DESIRE to present for the consideration of the Army a short paper upon the subject of a new system of Tactics, designed for the use of the infantry arm of the Service.

This system I have styled, A Manual of Drill and Tactics. By the term "tactics" I understand the method of fighting a regiment or battalion and manœuvring it in the field. By the term "drill," all instructions in the school of the soldier, company or battalion, whereby troops are fitted for service in the field or on the parade.

I will first discuss my system of tactics.

In preparing this system I have had three objects in view:

First, To conform to the modern system of warfare rendered necessary by our modern weapon.

Second, Flexibility, so that it may be readily adapted to the continuous advance in the art of war.

Third, Simplicity and adaptability to the wants of our own country and our volunteer system.

MODERN TACTICS.

Infantry tactics, using the term in its technical sense, may be divided into shock tactics and fire tactics.

By *shock tactics* should be understood the propelling of a body of men in close order upon the enemy, endeavoring by the mere force of the shock to carry a given position.

By *fire tactics* is understood that use of the weapon by which a position is made untenable, or by which the enemy is so damaged or demoralized as to prepare the way for the final charge.

In every engagement the *fire tactics* must precede and prepare the way for the use of the *shock*.

And as the charge in some form is the only way in which a line of men can occupy a new position, it necessarily follows that shock tactics must always be the end of a successful engagement.

Now, the improvement in the infantry weapon has not decreased in the slightest the value of *shock tactics*, but it has increased in a wonderful manner the possibilities of *fire tactics*; and this increase in the power of the weapon has rendered it necessary to adopt some method of defence against its deadly fire.

In the old systems, the men of a regiment or battalion were drawn up in two ranks, or possibly one rank, covering the entire front and ready for the final charge. This line opened and kept up the fire until the final moment of the shock, and therefore was always ready for the onslaught.

This system of course is very simple, but to expose a line of men in two ranks, or even single rank, to the murderous fire of troops armed with the modern weapon would be simple madness. How, then, shall we protect our men, without loss of front or depth, for the final use of the *shock*? This is the problem of modern tactics.

The first idea is, entrench them; but entrenching is only valuable when an army is acting upon the defensive, and only then in cases where the enemy gives you time to prepare your trenches.

The practical solution of the question, as has been accepted by all military men, *is the dispersed order*. That is, spread your men in such a manner as to reduce the size of the target, and to allow them opportunity to seek cover as individuals. But it must be remembered that in doing this the line must not be spread over a greater front than that to be occupied in the final charge, nor should any advantage as to *shock tactics* be sacrificed.

Thus the problem may be stated as follows:

Required a method of *dispersed order*, from which a line in *close order* may instantly be formed without decreasing the front occupied by the men. This line in close order being intended for the final charge should preferably be in two ranks.

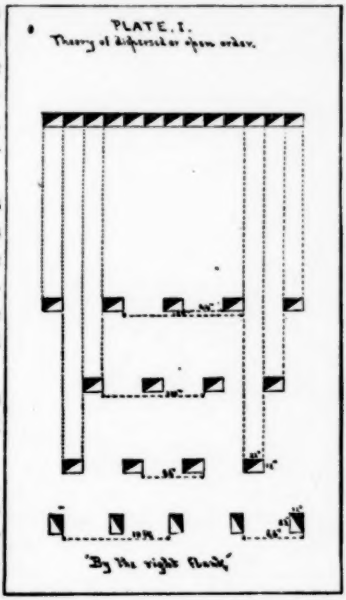
Each system of modern tactics must be based upon some solution of this problem, and all systems of drill must be subservient thereto.

Let us now consider the solution of this problem by the system now under discussion.

(*See Plate I.*) Consider a line of men in single rank. Each man occupies a front of twenty-two inches and a depth of twelve inches.

Now, if we withdraw two out of every three men, it will leave a line of men in dispersed order, with intervals of forty-four inches.

If we form two similar lines with the men withdrawn, placing them in echelon and at thirty yards distance between the lines, it gives us a formation in three lines in dispersed order. It is evident that this formation satisfies the problem.



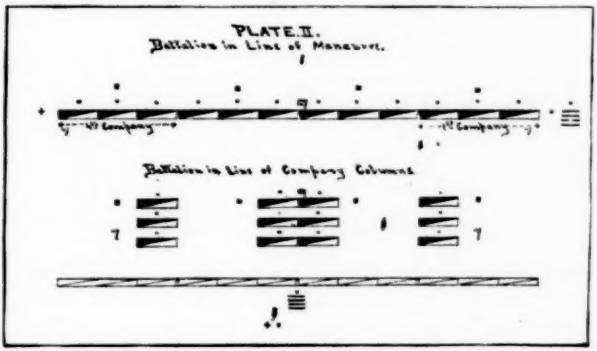
Here we have a dispersed order as required, and by advancing the lines we form simultaneously, a line in single rank in close order, without diminishing the front. This may be called the elementary formation of dispersed order.

The question now resolves itself as follows: what is the simplest method of employing this formation?

General Upton's system answers, "*deployment by numbers*;" but this is cumbersome and introduces that *bete noir of numbers under fire.* The German tactics answer, "company column," and this is decidedly the most practical answer; but the German company column is also cumbersome and not suited to our troops.

The system now under consideration is based upon a *company column*, and a much simpler one than that of the German army.

A company, in two ranks, is divided into three platoons. To form the company column these platoons are *ployed at half distance.*



To take open order, the first platoon deploys forward, at forty-four inches interval; the second platoon deploys in a similar manner thirty yards in rear; and the third platoon keeps thirty yards in rear of the second, ready to deploy by the right and left flanks at the proper moment.

Examine *Plate II.* Here is shown a battalion of four companies in line of company columns, ready for deployment into line of battle.

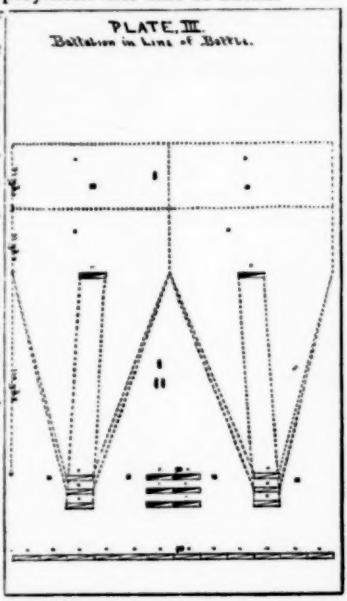


Plate III. shows the new "*line of battle.*" The leading platoons of the flank companies, in dispersed order, form the first division, the second platoons form the second division, thirty yards in rear, and the rear platoons form the third division or supports. The remaining two companies form the reserve division.

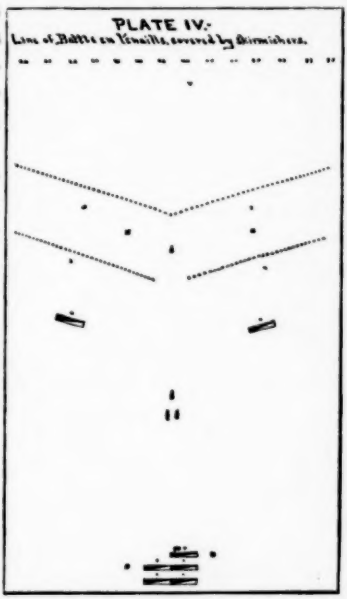
Plate IV. shows a line of battle, en tenaille, with one platoon deployed as skirmishers, covering the entire front. You will notice in both these formations, that the new *line of battle* covers the same front as the *line of manœuvre*, otherwise the old line of battle.

Plate V. shows a *battalion in action.* The skirmishers have retired and become part of the first division, which division is now engaged. The third division is deploying, by both flanks, into dispersed order; the reserve division is deploying into single rank.

Plate VI., Fig. 1, shows the second period of the engagement. The first and second divisions have united, the third division is advancing, and the reserve has advanced to supporting distance. *Fig.* 2 shows the preparation for the *final rush.* The three divisions have united, thus forming practically a single rank; this line is lying down or kneeling, delivering its fire. The reserve is now advancing at double time, and commences by firing volleys over the head of the men lying down. The charge may now be sounded, when the front rank rise, and all rush forward in double rank. (*See Fig.* 3.) Thus you will perceive that the problem is clearly solved by the system. We have a dispersed order covering the front of the battalion, giving all the advantage of fire tactics, which at the proper moment is assembled, without loss of front, into a line in double rank corresponding to the *old line of battle*, giving the maximum force of the

shock. It may be asked: In such a formation is there not a great loss in effective fire? Not so; to the contrary, a decided gain. One of the problems requiring solution is how to prevent the men from throwing away their ammunition. With breechloaders men can fire so rapidly that a large amount of ammunition is wasted in the first period of an engagement, and the fire slacks towards the end. True fire tactics require that the ammunition should be husbanded at the opening, and the fire increased to a climax just before the rush. You will notice in this system, the engagement is opened by one-twelfth of the battalion, then three-twelfths become engaged, then five-twelfths, then seven-twelfths, and finally the entire battalion, thus producing the exact character of fire desired. If arrangement be made to distribute to the rear divisions extra ammunition, which they could carry forward to the engaged divisions, nothing more would be needed to preserve a constant and increasing fire.

Germany proposes to control this by constant discipline and drill, thus teaching men to husband their ammunition. This may be possible in European armies, but it is impracticable in our volunteer system.



The proposed formation of a *regiment in line of battle* is as follows: The first battalion in line of battle, the second battalion in company columns, and the third battalion massed as a reserve.

It is intended that in an order of battle in three lines, under the proposed system, the battalions of the same regiment shall be in rear of each other. This prevents confusion, and questions of command in and after the final rush.

Of course this is not the only method of handling a battalion under fire by this system of tactics. I have used it simply to demonstrate the theory of dispersed order.

A line of men at forty-four inches interval can deliver a fire equal to the old line of battle in two ranks, armed with the old weapon.

Remembering this, let us consider, first, *an advancing line.* Open fire with the first division, and as the fire begins to slacken, advance the second division, passing them through the intervals, and open fire, thus allowing the first division to fall back to obtain more ammunition. In a

similar manner the third may replace the second and the first the third, until just before the rush, when all three may be combined in a *climax of fire*. *A retreating line* is handled upon the reverse principle. That is, the first division falls back through the second. When it is required simply to *hold* a *position* the supports and reserve are to be used to strengthen the line at weak points.

The *reserve* deployed in *single rank* may also be found very useful to check a stampede. Let it be remembered that one special claim of the system is flexibility and adaptability to such circumstances as may actually occur on the field of battle.

Having now discussed the general plan of the tactics, I will proceed to the *manual of drill*, considering it in the usual order.

Concerning the manual of drill the following advantages are claimed for the system :

1st, A simple and serviceable manual of arms.

2d, A simple method of forming column of fours.

3d, Absolutely no inversion.

4th, No numbers used on the field of battle or under fire.

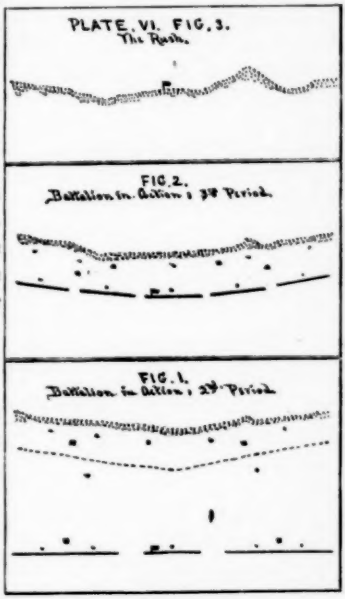
5th, An automatic system of commands, requiring the minimum of abstract memory.

Before proceeding to discuss the minor portions of the system, I will give a few minutes to the subject of a *column of fours* and the necessary evil attached thereto—that is, the numbering of the men and requiring each man to retain a certain relative position in ranks. For purpose of parade this presents no difficulty, but the use of numbers under fire and upon the field present such a self-evident obstacle that no discussion of the question is at all necessary here.

The question arises, is a column of fours necessary ? To this, the answer is undoubtedly *yes*. Men will not march at facing distance, and to attempt to march a battalion in column of files means simply to cause them to straggle to twice the proper length of the line. Hence on the march some method is

needed, that will permit men to march at intervals of about thirty-two inches, and at the same time that will not stretch the column over a greater space than the length of the line. For this purpose the column of fours is the simplest solution. Can it be done away with under fire? To this question the system under discussion offers a clear and prompt answer—Yes.

Let us *examine Plate II.* Here we have what is termed a "line of company columns." If we execute the right or left flank, and permit the men to fall back to, say twenty-eight inches, it will give ample intervals for marching, and it is evident that the straggling will not increase the length of the column beyond the battalion front, inasmuch as the interval between the platoons is sufficient to prevent this. And it is also evident that, at the command "halt," the distance to be gained by the rear men of each platoon is at the maximum but a platoon's length, say ten yards. Hence in this formation the battalion may be *manœuvred under fire*, without the *use of numbers*, with the additional advantage of being always ready to deploy into the line of battle.



The only other use of numbers in drill is to deploy into open order. It will soon be seen that in the system under discussion no numbers are used in deployments. Therefore numbers may be forgotten on the field, and the rule is that from the time of forming company column until line manœuvre is re-formed, the column of fours should not be used, except as a matter of exercise and for parade purposes.

The fourth claim is thus made good—no numbers under fire or on the field of battle.

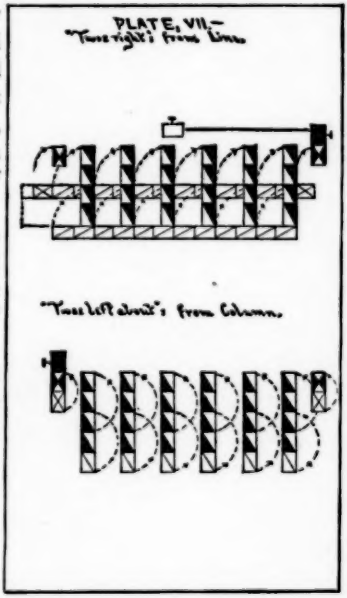
The method of forming columns of four will be explained under the head of School of the Company.

"SCHOOL OF THE SOLDIER."

The School of the Soldier is not materially changed, save in the manual of arms, which is entirely new and based upon new principles. The manual of arms has been for many years a mere parade manual, and of little practical value save as an exercise.

In preparing this new system, I watched for months different sentinels on post, so as to obtain such positions as are most suitable to the freedom and ease of the soldier.

I find that the piece is usually carried either on the right or left shoulder, and almost invariably with the barrel uppermost. When carried upon the right shoulder, it is grasped at the small of the stock; when carried upon the left, the hand is under the butt.



A very slight experience will show any one that these are the natural positions. I have therefore adopted them, calling the position on the left shoulder, with hand under butt, "*Shoulder arms*," and the position on the right shoulder, grasping small of stock, "*Shift arms*."

Support arms and secure arms, being no longer necessary, I have omitted them entirely. I have therefore changed the command, "*Arms port*" to "*Port arms*."

The next change that suggested itself is the following: Was it possible to get rid of the necessity of always returning to a *carry*? The original object of the return to a single position was undoubtedly to avoid teaching the soldier too many manœuvres. In the old system, a soldier was required to learn how to go to and from the carry to any other position. Thus, if there were (N) positions a soldier would have to learn (2 N) manœuvres.

Now, I discovered that a soldier could pass from any position to *port arms in one motion*, and that he could pass from port arms to any other position *in two motions*. Hence, if we make port arms an intermediate position, a soldier can pass from any position of the manual to any other in three motions, the first motion always being *port arms*. And a soldier need only learn how to go *to and from port arms* to any other position; or, if there be N (position), he must learn (2 N) manœuvres. Thus we gain the advantage of being able to pass directly from one position to any other without requiring a soldier to learn any greater number of manœuvres than at present.

An examination of the system will show that, in addition to these advantages, it is peculiarly suited to the *natural conformation of the man*.

Space will not permit me to enter into any greater detail in this paper.

School of the Company.

The Company is divided into three platoons, and is supposed to consist of :

1 Captain,
3 Lieutenants,
1 First Sergeant,
9 Sergeants,
9 Corporals,
2 Musicians,
139 Privates.
Total, 150 men and 4 officers.

The system is applicable to larger or smaller companies.

I do not believe, however, that any advantage will be gained by an increase over and above 150 men. With that number a Lieutenant will command in open order a line fifty-six yards long, which is all one man can attend to. With 150 men the Captain should be mounted.

Each platoon forms, as it were, a separate tactical unit, corresponding to a company in a ten-company battalion, and the company corresponds to a division. The officers and non-commissioned officers are posted in each platoon, upon the principle now applying to companies.

The platoons are posted in order of number from right to left. The Captain acts as a quasi field officer in command of his three platoons.

The men in each platoon are posted in two ranks.

And I would now call your attention to the special feature of the system, viz.: *The ranks are always thirty-two inches apart.* This is the key-note of the drill ; and it is due to this simple devise that inversion is absolutely avoided.

It is not my intention to enter in detail in this paper. I will, however, call your attention to a few points in company drill.

First—The Column of Fours.

The ranks being at thirty-two inches distance. The command *twos right,* executed by each rank independently, brings the company into a column of fours, with thirty-two inches interval. For this purpose the ranks are counted off in twos. (See Plate VII., Fig. 1.)

Remember each man occupies a front of twenty-two inches and a depth of twelve. Therefore, from breast to breast or heel to heel, the rear rank is thirty-two plus twelve inches from the front, or forty-four inches, which is the front of two men.

You will also perceive (Plate VII., Fig. 2) that the rear rank may wheel by twos entirely about, without interfering in any with the front rank. It is thus evident that thirty-two inches distance renders the

ranks as absolutely independent as though they were in column at half distance. And it requires no demonstration to show that *in* a column in single rank, at half distance, there can be no inversion.

It will also be noted that as the wheel by twos occupies such a small space, and as the First Sergeant's interval permits an interior company to move out of line to the rear, the about face and to the rear march become unnecessary, and consequently the numbers are never inverted.

In reference to the methods of passing from order of column, to line and vice versa, in the school of the company, all that need be said here is that they are executed upon the same general principles as in Upton's Tactics, save such differences as are necessary in consequence of the independence of the ranks.

A single instance will explain my meaning, *Right front into line.*

This is not executed simultaneously by both ranks, as in Upton, but the rear rank marks time until *three sets of twos* of the front rank have changed directions. To those familiar with Scott and Casey this will be perfectly clear.

The general plan of using the company column as a method of manœuvring on the field and as a preparatory formation has already been discussed.

I will now explain the method of deploying into open order, by the flank, and to the front.

In the movement by the flank, the platoon being faced to the right (or left), the first two men, front and rear rank, step off together at the command march. They are followed by each succeeding file at intervals of ten feet. At the command halt, given after the platoon is deployed, the front rank men halt and face to the front. The rear rank men place themselves forty-four inches to the left of their file leaders.

In the deployment to the front the indicated file marches directly to the front, the remaining front rank men taking the double time oblique until they have gained intervals of four (4) paces. The rear rank men follow their file leaders. At the command *halt* the rear rank men place themselves forty-four inches to the left of their file leaders.

It will thus be seen that deployments are made without regard to numbers. If men are killed off, it is merely necessary that the file closers should cause the men to cover off, and the platoon is ready for deployment again.

And as the column of fours is not used on the field, the fourth claim of *no numbers under fire* is made good.

Before closing my remarks on the company I will state that in forming single rank the rear rank is deployed on the left of the front rank. Hence all mixing, due to interpolating sets of the rear rank between those of the front, is avoided.

I say nothing concerning the order of skirmishers, as it is but a further development of the dispersed order.

SCHOOL OF THE BATTALION.

The battalion is supposed to consist of four (4) companies and is commanded by a Lieutenant Colonel, assisted by a Major. The Major commands the front division. The battalion commander controls the whole movement, and advances the rear divisions at the proper time.

I wish merely to note a few points in battalion drill. 1st. As the important feature of the system, is how to pass to and from the order of company columns to line of battle in open order, and to and from company columns, such movements are therefore given the greatest prominence in the drill, and only the fewest and simplest movements are given for passing from order of column to order of line of manœuvre, and vice versa.

2d. Great prominence is given to manœuvring in line of company column.

3d. I cannot close without explaining my general guide system, whereby battalion drill is so wonderfully simplified, and my system of automatic commands rendered possible.

GENERAL GUIDES.

The *general guide* of a company is the First Sergeant, and those of the battalion are two non-commissioned officers specially selected. They must not be confounded with the old general guides.

The general guides of a battalion each carry a guidon ; one is posted on the right, and one on the left. It is their duty to retain a certain relative position to the battalion when in column, viz : *when it is right in front* they should be on the right of the battalion. *When left in front* they should be on the left.

All movements are made *to or from* the general guides under three rules. To understand these rules I give the following definition :

A formation is said to be major or minor to another, depending upon the size of the subdivisions. Thus a column of platoons is major to a column of fours, and vice versa.

General Rules.

Rule 1st. A passage from a major to a minor formation is executed *towards* the general guides.

Rule 2d. A passage from a minor to a major formation is executed *from* the general guides.

Rule 3d. The chiefs of subdivision, on the completion of any movement, announce the guide to the side opposite to the general guides.

This system has three great advantages.

1st. The commander need not consider at all the question of guides, as this is fixed by Rule 3d.

2d. The old necessity for a consideration of the question of *right or left*, in front, is replaced by a simple *look at a flag*, thus substituting a simple act of sight for a more complicated intellectual act.

3d. The system of automatic commands is thus rendered possible. For example, a commander merely uses such commands as indicate his will, as follows:

Form column of platoon—march.

Form column of fours—march.

Form company—march.

The proper method of executing these commands being indicated to the chiefs of subdivision, by the position of the general guides.

I will give an example.

Being in column of fours, the command is *form column of platoons* The several chiefs glance at the guidons. If they are on the right, it being a major passage, they command *platoons left, front into line*, or vice versa.

This system allows the battalion commander to give his attention to more important questions than the minute details of the movement.

It is not intended, however, to limit in any way the battalion commander. He could in the above case, if he saw fit, give the command *platoons right, front into line, march.* This of course inverts the battalion ; that is, changes it from right to left in front. Such movements are provided for as follows :

Commands are divided into two classes, regular and irregular. Regular commands are such as do not invert the battalion, and are automatic.

Irregular commands are such as do invert the battalion, and are not automatic.

General Rule. On the completion of an *irregular movement* the general guides cross to the opposite flank of the battalion.

It will thus be seen that the movement inverts the battalion and the crossing over of the general guides ; restores the battalion to its proper relative position and front.

The simplicity of the system, and its value, will be readily perceived. General Upton evidently had a glimpse of its value when he introduced the idea of "*a dress to the side opposite to the file closers,*" but does not seem to have carried the idea to its legitimate extent.

In closing, I would state that in several details, which, of course, I have no time to speak of in this paper, many new and valuable improvements have been introduced. My object has been to present a simple serviceable manual of drill, and a flexible system of tactics.

TARGET PRACTICE AT A FIXED TARGET REPRESENTING INFANTRY WALKING OR DOUBLE-TIMING, OR CAVALRY WALKING, TROTTING OR GALLOPING.

BY FIRST LIEUTENANT SEDGWICK PRATT,

THIRD ARTILLERY.

EIGHTY-EIGHT, one hundred and forty-five, one hundred and seventeen, two hundred and thirty-five and three hundred and fifty-two yards are regarded as the average distances passed over in one minute by infantry at a walk and double time and cavalry at a walk, trot or gallop respectively.

Suppose a cavalryman to gallop in a circle whose radius is 100 yards, and that he is fired upon by a rifleman located at the centre of the circle.

The cavalryman in five seconds will pass over 29 yards, represented by the arc AB, Fig. 1.

If he were 200 yards distant he would pass through the arc $A'B'$, and at 300, 400, etc., yards, through the arcs $A'B''$, $A'''B''$, etc., (regarding these arcs equal).

Now, supposing the cavalryman to be at a halt, and that by some means the rifleman's rifle be given a tendency to move in a direction *opposite* that in which the cavalryman had previously moved, so that in five seconds it would traverse the arcs AB, $A'B'$, etc., it is evident the rifleman will have about the same difficulty in keeping his rifle on the halted cavalryman as he had under reverse conditions.

This suggests that practice in firing at a movable target can be had by moving the marksman on his own ground at a certain rate while firing at a fixed target, and in a manner as follows :

Place him in position (standing, kneeling or lying down, according to range) upon a movable platform, so arranged that it can be turned by a second party at a rate depending upon the distance and cadence of the supposed movable object.

Suppose the *fixed* target at 100 yards to represent a cavalryman galloping at this distance. In order that the corresponding motion be given to the platform, it should make one complete turn in 1m. 47s. Allowing the marksman five seconds in which to fire one shot while the platform is turning, and supposing the latter to make one complete revolution in 1m. 47s., it would in five seconds pass through an arc of 16° 10′, which is the greatest arc through which the platform will be required to turn.

For other ranges and rates of motion the following table shows the proportional part of 16° 10′ through which to turn the platform in five seconds:

TABLE I.

RANGE.	GAIT.	PART OF 16° 10′.	GAIT.	PART OF 16° 10′.	GAIT.	PART OF 16° 10′.	GAIT.	PART OF 16° 10′.	GAIT.	PART OF 16° 10′.
YDS.										
100	Gallop.	1	Trot.	$\frac{2}{3}$	Cavalry Walk.	$\frac{1}{3}$	Double Time.	$\frac{2}{5}$	Infantry Walk.	$\frac{1}{4}$
200		$\frac{1}{2}$		$\frac{1}{3}$		$\frac{1}{6}$		$\frac{1}{5}$		$\frac{1}{8}$
300		$\frac{1}{3}$		$\frac{2}{9}$		$\frac{1}{9}$		$\frac{2}{15}$		$\frac{1}{12}$
600		$\frac{1}{6}$		$\frac{1}{9}$		$\frac{1}{18}$		$\frac{1}{15}$		$\frac{1}{24}$
800		$\frac{1}{8}$		$\frac{1}{12}$		$\frac{1}{24}$		$\frac{1}{20}$		$\frac{1}{32}$
1,000		$\frac{1}{10}$		$\frac{1}{15}$		$\frac{1}{30}$		$\frac{1}{25}$		$\frac{1}{40}$

The platform might be constructed as shown in Figs. 2, 3 and 4.

The rails *aa*, Figs. 2 and 3, are of half-inch stuff nailed together in the form of a trough (see Section *ss*, Fig. 2), twenty feet long and six inches in other dimensions. This form will secure stiffness and lightness. They are united at the point *e* by means of solid pieces *c*, *c*, inserted and nailed to the bottom and sides of the trough and then bolted to each other.

At *b*, *b*, *b*, *b* are wooden cross pieces nailed to the upper edges of the rails and to the solid pieces *c*, *c*, at these points. They serve also as supports for the platform *A*, which is made of inch boards and in dimensions four feet by eight feet.

The rails open out to the rear, so that their rear ends are seven feet apart. These ends are joined by the circular piece *b*, to the rear edge of which is attached a metal gear *g*, having eight teeth to the inch and its centre at *e*, where there is a pintle driven into the post *i*. Upon this pintle rests a plate which caps the pintle hole *e*.

f, *f*, *f*, *f* are small traverse wheels to support the frame. They run on wooden traverse circles *h*, *h*, laid on the ground. The whole arrangement is turned about *e* by means of gearing shown at *K*.

Fig. 5 shows an arbor for this gearing. It has a shoulder and threaded end for the nut *n*, Fig. 4. The arbor to which the crank is attached has in addition a square head and a sleeve for the slot in the gear-wheels.

There is a washer needed to adjust the gears on the arbors at proper height.

The gears are double, as shown in Fig. 4, the smaller one having $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$ or $\frac{1}{2}$ the number of teeth in the large one. By compounding these gears two at a time or using them singly the various motions necessary may be given to the platform, the crank in *all cases* being turned five times, once in a second.

The arbor *m* is secured to the lower plate of the frame by means of the nut *n*. In the lower plate is a slot instead of journal holes in order that the arbor *m* may be adjusted in reference to the crank arbor which works in journal holes in both plates.

An arc of 16° 10′ (centre at *e*, Fig. 2), measured on the gear *g*, will include 560 teeth of this gear. If we give to a pinion, working in this gear, 112 teeth and turn it five times (once a second), the platform will turn through the same arc, *i. e.*, 16° 10′, thus corresponding in motion to that of a horse distant one hundred yards and moving at a gallop across the field of fire of a marksman on the platform.

Table II. gives the number of teeth required by the pinion in order that the motion of the platform (the crank always being turned five times, once a second) shall correspond to the different gaits at various distances.

TABLE II.

RANGE.	GAIT.	NUMBER OF TEETH.	GAIT.	NUMBER OF TEETH.	GAIT.	NUMBER OF TEETH.	GAIT.	NUMBER OF TEETH.	GAIT.	NUMBER OF TEETH.
YDS.										
100		112		75		$37\frac{1}{3}$		45		28
200		56		$37\frac{1}{3}$		$18\frac{2}{3}$		$22\frac{1}{2}$		14
300	Gallop.	$37\frac{1}{3}$	Trot.	25	Cavalry Walk.	$12\frac{4}{5}$	Double Time.	15	Infantry Walk.	$9\frac{1}{3}$
600		$18\frac{2}{3}$		$12\frac{1}{2}$		$6\frac{2}{3}$		$7\frac{1}{2}$		$4\frac{2}{3}$
800		14		$9\frac{3}{8}$		$4\frac{4}{5}$		$5\frac{5}{8}$		$3\frac{1}{2}$
1,000		$11\frac{1}{5}$		$7\frac{1}{2}$		$3\frac{11}{15}$		$4\frac{1}{2}$		$2\frac{4}{5}$

All pinions having less than thirty-eight teeth will be too small to admit of a hole for the arbor, hence it will be necessary to combine larger ones in order to produce the low motions.

The arrangements have been computed and appear in Table III.

The following *double* pinions have been selected, $\frac{56}{112}$, $\frac{56}{168}$, $\frac{45}{180}$, $\frac{45}{270}$, and also the single pinions 38 and 75.

The numerator shows the number of teeth in the smaller pinion of the double pinion and the denominator the number in the larger.

The crank is in all cases turned once a second for five seconds.

For a greater motion than a gallop at 100 yards, as for instance for that of a pigeon (sixty-eight miles per hour) at one hundred yards, use $\frac{270}{45}—\frac{112}{56}$.

TABLE III.

RANGE.	GALLOP.	TROT.	CAVALRY WALK.	DOUBLE TIME.	INFANTRY WALK.
YDS.					
100	$\frac{112}{56}$	75	$\frac{56}{168}—\frac{112}{56}$	$\frac{45}{180}$	$\frac{45}{180}—\frac{112}{56}$
200	$\frac{56}{112}$	$\frac{56}{168}—\frac{112}{56}$	$\frac{56}{168}—\frac{56}{112}$	$\frac{56}{112}—\frac{45}{180}$	$\frac{45}{180}—\frac{56}{112}$
300	$\frac{56}{168}—\frac{112}{56}$	$\frac{56}{168}—75$	$\frac{45}{270}—75$	$\frac{56}{168}—\frac{45}{180}$	$\frac{45}{270}—\frac{56}{112}$
600	$\frac{45}{270}—\frac{112}{56}$	$\frac{45}{270}—75$	$\frac{45}{270}—38$	$\frac{45}{270}—\frac{45}{168}$	.....
800	$\frac{45}{180}—\frac{56}{112}$	$\frac{45}{270}—\frac{56}{112}$	.....	.....	.....
1,000	$\frac{45}{180}—\frac{45}{270}$	$\frac{45}{270}—\frac{45}{180}$	.....	.....	.....

Each gear is marked with its number of teeth (see Fig. 4—plan.)
Of the double pinions one each is required; in all, six.

EXAMPLE.

What is the arrangement of the gearing for a cavalry walk at two hundred yards?

From the table we have $\frac{56}{168}—\frac{56}{112}$.

If not already on the arbor *m* place thereon the double pinion $\frac{56}{168}$, so that 56 will engage in the platform gear. Then place on the crank arbor (if not already on) the double pinion $\frac{56}{112}$, so that 56 will engage in 168 of the $\frac{56}{168}$. (See Fig. 4.) Slide the $\frac{56}{168}$ pinion till it and the $\frac{56}{112}$ engage, and make the arbor *o* fast to lower plate by the nut *n*. Unclamp the thumbscrew *s* and slide whole frame till $\frac{56}{168}$ engages in platform gear. Fasten frame to post by thumbscrew *s*. Turn crank five times, once a second.

In using Table III. to arrange the gearing for a particular velocity, place the double pinion represented by the right hand fraction on the crank arbor, so that the gear represented by the numerator will work in the gear represented by the denominator of the left hand fraction, the numerator of the latter working in the platform gear. When there is but one fraction given the gear represented by its numerator should work in the platform gear.

The following table shows the number of *yards* a marksman must aim ahead of a moving point in order to hit it. Wind and drift are not considered in this table. The times of flight used in the construction of the table are those calculated by Lieutenant Zalinski, Fifth Artillery, and published in Ordnance Note 163.

TABLE IV.

For 405 gr. Bullet, Service Charge, I.V. = 1,350, f. s.

Range.	Gallop.	Trot.	Cavalry Walk.	Double Time.	Infantry Walk.
100	1.40 yds.	.93 yds.	.47 yds.	.56 yds.	.35 yds.
200	3.	2.	1.00	1.20	.75
300	4.78	3.19	1.59	1.91	1.20
600	10.91	7.94	3.97	4.36	2.73
800	15.72	10.48	5.24	6.29	3.93
1,000	21.11	14.07	7.03	8.44	5.28

For 500 gr. Bullet, Service Charge, I.V. = 1,260, f. s.

100	1.48 yds.	.98 yds.	.49 yds.	.60 yds.	.37 yds.
200	3.12	2.08	1.04	1.25	.78
300	4.88	3.26	1.63	1.95	1.22
600	10.84	6.56	3.28	4.34	2.71
800	15.39	10.26	5.13	6.14	3.85
1,000	20.41	13.60	6.80	8.16	5.10

Or expressed in "*points*" on the lateral scale of rear sight, which is more practical.

TABLE V.

Range.	Gallop.		Trot.		Cavalry Walk.		Double Time.		Infantry Walk.	
	405 gr.	500 gr.	405 gr.	500 gr.	405 gr.	500 gr.	405 gr.	500 gr.	405 gr.	500 gr.
100	8.4	8.9	5.6	5.9	2.8	3.0	3.4	3.6	2.1	2.2
200	9.8	10.2	6.5	6.8	3.3	3.4	3.9	4.1	2.4	2.3
300	10.4	10.7	6 9	7.1	3.5	3.6	4.2	4.3	2.6	2.7
600	11.9	11.8	7.9	7.9	4.0	3.9	4.8	4.7	3.0	3.
800	13.2	12.9	8.8	8.6	4.4	4.3	5.3	5.2	3.2	3.2
1,000	14.3	13.9	9.5	9.2	4.8	4.6	5.7	5.5	3.6	3.5

The rear sight should be constructed to admit an adjustment for a deviation of thirty-five points or more caused by wind, drift and the motion of the target.

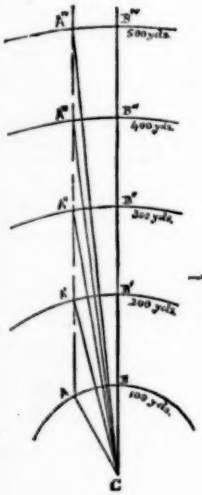


Fig. 1.

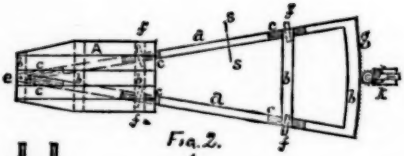


Fig. 2.
1/60

Section SS

Fig. 3.
1/60

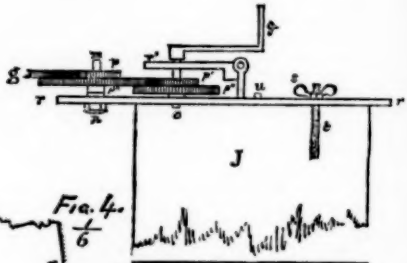
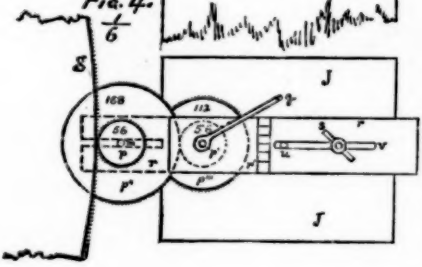


Fig. 4.
1/6

Fig. 5.
1/6



REVIEWS.

[Publications of military interest will receive careful and intelligent notice if addressed "MILITARY SERVICE INSTITUTION, Governor's Island, N. Y. H."]

PRICE'S "ACROSS THE CONTINENT WITH THE FIFTH CAVALRY."*

"Time changes all things—most of all that little world, a regiment. Old men go, "new men come; some die, others exchange; and gradually the old interests fade as a "new society springs up. Men who have been prominent figures in the regiment be- "come but names, to which no one attaches any particular ideas."

The above paragraph, from an old English story, and which has been cleverly utilized by Captain Price, was evidently inspired by a soldier, and if the words do not have the rattle of the scabbard and the ring of the spur about them, at least they seem to echo the mournful cadence of the trumpeter's good night.

If anything can keep the "old interests from fading altogether," and the names and exploits of once "prominent figures" from being forgotten, it is such a chronicle as that before us.

It is the record of more than a quarter of a century of incessant marching and countermarching; of innumerable combats and campaigns; of participation in both grand and minor operations of war; of occasional rest and recreation in garrison, followed by long and stern chase after the Indian foe; of hunger and thirst; of burning heat and intense cold; of blood and pain and death. And yet, in these respects, its history is like that of many another regiment in our service.

The arrangement of this history is simple and concise. It comprises three main divisions—of "Narrative," "Officers' Records," and "Appendix," in the order named.

Part I.—the "*Narrative*"—divided into periods, begins with a brief description of the circumstances attending the creation of the regiment in 1855, when the army was increased by two regiments of cavalry and two of infantry. A careful and exhaustive analysis of the commissioned *personnel* of the new regiments of cavalry follows, and the author warmly disputes the assertion of the Comte de Paris, in his "History of the Civil War," that "Mr. Jefferson Davis, then Secretary of War, took "advantage of the fact that they had not been designated by the title of dragoons to "treat them as a different arm and *to fill them with his creatures*, to the exclusion of "regular officers, whom he disliked."

In reply, Captain Price states that it was purposely intended that two regiments of cavalry should be raised and maintained as a separate arm of the service as the dragoons and mounted riflemen were maintained as separate arms; and further, that "the "epithet of 'creatures' thus applied to the officers of the cavalry regiments embraces "McClellan (to whom M. le Comte was an aide-de-camp), Sumner, Thomas, Emory, "Sedgwick, Stoneman, Stanley, Carr and others, who became distinguished Generals of "the National Army; and Albert Sidney Johnston, Joseph E. Johnston, Robert E. "Lee, Hood, Hardee, J. E. B. Stuart, Fitzhugh Lee and others, who became equally "distinguished as Generals of the Confederate Army. * * The simple fact that many "of these officers had served in the field during the war with Mexico, * * and that "nearly all had seen Indian service, * * together with their subsequent records dur- "ing the memorable struggle of 1861-65, * * answers the assertion that such officers "could be the creatures of any man. * * It is a historical fact that the officers thus "selected were superb soldiers, and that they were from the best to be found in the "army and in civil life." Like some of its predecessors, the Fifth (then Second) Cavalry was organized and set-up at Jefferson Barracks, and in October, 1855, made its first march. With 750 men and 800 horses, under the command of Colonel Johnston, it

**Across the Continent with the Fifth Cavalry.* Compiled by Geo. F. Price, Captain Fifth Cavalry, U. S. A. With four portraits on steel. 8vo., cloth, $5. New York: D. Van Nostrand. 1883.

proceeded through Missouri, Arkansas, and the Indian Territory to Fort Belknap, reaching that post in the midst of cold so intense that 113 oxen were frozen, in camp, on the day of their arrival."* Among the ladies who accompanied their husbands on this march are mentioned Mrs. Johnston, Mrs. Oakes, Mrs. Palmer, and Mrs. Johnson.

During its service in Texas the regiment fought forty well contested engagements with the Lipan, Apache, Kiowa and Comanche Indians. Of these affairs Jenifer's, on the Nueces, Hood's brilliant action on Devil's River (where the value of the revolver was tested), Van Dorn's battle of the Witchita village (in which eighty Indians were killed and three hundred animals captured) and his fight on the Nescatunga (when fifty warriors were killed and thirty-six captured) were notable. The difficulties attending service on an international boundary are graphically described in the chapter on the Rio Grande campaign, where the temptation to follow marauding Indians across the river into Mexico was irresistible (as it has since proved to our commanders on the same ground)—the quiet little raids upon Comanche camps, made without consulting the authorities at Washington or the City of Mexico, being instances. In the operations (1860) against the Mexican guerrillero Cortinas, Captain Stoneman captured the Mexican town of La Mesa, including three hundred armed men, whom he supposed were followers of Cortinas, but, to his great consternation, they proved to be a regular garrison of the Mexican army. His prisoners were at once released with profuse apologies. Subsequent arrangements between Colonel Lee and the General commanding the Mexican forces on the Rio Grande led to the final overthrow of Cortinas and the restoration of harmony.

Captain Price confines himself to a simple statement of facts regarding the transfer of the Fifth Cavalry from Texas to Carlisle Barracks at the breaking out of the war in 1861. All comments upon the political causes of the great conflict are avoided, excepting where they affect the military operations. The movements of the regiment are given in detail, and their accuracy may be depended upon by the coming historian. "The loyalty of the enlisted men was seriously tested before leaving Texas. The State "agents offered them good pay and liberal bounty if they would enter the Confederate "service, but, with few exceptions, they confirmed the opinion entertained of them by "their officers, and were faithful to their obligations."

The history of the Fifth from 1861 to 1865 is full of brilliant feats of arms and patient devotion to duty. Like other regiments, its old blood was needed in more responsible positions than the command of companies or detachments. To these positions came younger (although not less gallant) men. It is not possible, within our limits, to mention the names of even the general engagements in which the regiment took part. Hardly a page of the history of the Army of the Potomac would be complete without its name thereon. The author concludes his account of the regimental service in Virginia—which might well have been extended beyond the twenty-five pages allotted—with these very soldierly words: "Nearly eighteen years ago the sword "was sheathed between the North and South. The dead of the conflict have sacred "sepulture, and stately monuments have been erected on hill side and plain where "battles once raged, on which are inscribed in glowing words the story of the matchless "heroism of American soldiers. Peace has spread her wings over the desolations of the "terrible conflict, and Law and Liberty are declared attributes of constitutional govern-"ment for all classes within the United States. For such a nation the truth of history "is the grandest monument." The regiment was employed on reconstruction duty in the South from 1865 to 1869, and it is noted that "the men who had fought in the "Confederate armies, with rare exceptions, zealously supported the army in its efforts "to maintain order and enforce the laws."

The regimental frontier service was resumed in the late autumn of 1868, and during the next two years consisted of operations in Kansas, Nebraska and Colorado, the most important engagement being that at Summit Springs, Colorado, under Major Carr, resulting in the death of Tall Bull and sixty Sioux, Cheyennes and Arapahoe warriors, together with the capture of 418 animals and an immense quantity of arms and supplies —the description by Captain Price (who participated) is one of the best in the book. In 1871 the regiment was sent to Arizona, and during their sojourn in that rugged region, under the direction of that successful Indian fighter, General Crook, they taught the Apaches a terrible lesson. This part of the narrative contains a picturesque description of the country from the personal observation of the writer. During its three years in Arizona, the Fifth had ninety-seven combats with the Apaches, and General Sherman is quoted as saying that "the services of the Fifth Cavalry in Arizona were unequalled

*December 27th, 1855.

"by that of any cavalry regiment during the war of the Rebellion." Since 1875 the trail of this distinguished body of horse might have been followed from Arizona, *via* New Mexico, back to Kansas, to aid in scourging the turbulent Sioux. At the close of this campaign the Department commander (who had taken the field himself) congratulated the troops in orders, saying that, "At times you have been out of reach "of your base of supplies in most inclement weather, and have marched without food "and sleep—without shelter. In your engagements you have evinced a high order of "discipline and courage; in your marches, wonderful powers of endurance; and in your "deprivations and hardships, patience and fortitude. Indian warfare is of all warfare the "most dangerous, the most trying and the most thankless. Not recognized by the high "authority of the United States Congress as war, it still possesses for you the disadvan- "tages of civilized warfare with all the horrible accompaniments that barbarism can "invent and savages execute. In it you are required to serve without the incentive to "promotion or recognition—in truth, without favor or hope of reward." Nearly 450 officers and men of the army were killed or wounded in this campaign. The last chapter of the "Narrative" recounts the subsequent operations in Wyoming (1877), against the Nez Perces, in Nebraska (1878), against the Cheyennes, and in Colorado (1879), against the Utes, and brings the record up to 1883. During the twenty-eight years of its existence the Fifth Cavalry has participated in 297 engagements, in which one-third of its officers have been killed or wounded. One-half of the total number of officers commissioned have served with volunteer troops, and the same proportion has been breveted for gallantry in action.

Part II., "*Officers' Records*," contains the military history of 352 officers. These records are remarkably full, and have been subjected to careful revision at the hands of the officers concerned, or, in case of death, by some member of the family. In each case it is a continuous military record without regard to the army served in. They are not mere memoranda of promotions and changes of station, but in most cases extended biographical sketches. Among the most elaborate appear to be those of Johnston (A. S.), Thomas, Lee (R. E.), Emory, Sedgwick, Merritt, Carr, Hardee, Royall, Stoneman, O'Hara (the author of "The Bivouac of the Dead"), Lowe, McIntosh, Custer, Hood, Lee (Fitzhugh), and Almy. Many of these records contain historical facts never before in print. The details of the arrest and execution, as a spy, of a former officer of the regiment (Williams) are here given in full.

Part III., "*The Appendix*," comprises Lists of Field Officers, Commissioned and Non-Commissioned Staff, Regimental Commanders, Company Officers (arranged by rank and by companies), Officers who have served as Enlisted Men in the Regiment, Stations, Changes of Station and Field Service, Battle Record, Roll of Honor of Enlisted Men, Officers who have been Killed in the Line of their Duty, Officers who have served in the Volunteers, and Brevets. The work, which is dedicated to the memory of General Thomas, bears evidences of the conscientious labor bestowed upon it by Captain Price, who has been engaged on it for the last seven years; four of which were devoted exclusively to the collection of material; this involved the scrutiny of every muster-roll and more than 3,000 other official papers concerning the service of the regiment. The publisher deserves credit for the excellent type and paper. The regiment and the army may well feel proud of such a monument, the inscriptions upon which will be read, and taken to heart—let us hope—by countless heroes yet unborn. R.

POND'S "THE SHENANDOAH VALLEY."*

It is truly refreshing, after the lapse of nearly twenty years since the occurrence of the events recorded, to read a careful and conscientious history of the Valley campaign of 1864, made up from the records and the official reports. It awakens the hope that after the mass of contemporary newspaper report and of so-called history, written in the interest of individuals, has exhausted itself, that from the Records of the War, as arranged and classified under the War Department, data may be at hand to complete a fair history of the Rebellion, and the successive steps which were necessary to suppress it. Mr. Pond has certainly done his part of the work faithfully and well in the book before us, and he is to be congratulated on his success as a historian.

General Sheridan came to the command of the troops in the Valley in almost as independent control as were the chieftains of the Roman Legions in the century before the Christian era, so full of war for the decaying Roman Republic.

The want of success in managing armies at the seat of Government had reconciled

* Campaigns of the Civil War, xi. "*The Shenandoah Valley in* 1864." By Geo. E. Pond. New York: C. Scribner's Sons. 1883.

the authorities in Washington, as well as in Rome, to a policy of non-interference in the conduct of campaigns, they being well content provided the enemy was kept a reasonable distance from their doors. Like some of the later Roman chieftains, he entered a field where his predecessors had met with naught but disaster, and like the latest and greatest of those of the time we have mentioned, he covered his command with glory, and by his magnetic influence at least once turned defeat into victory. Cæsar claimed that his troops fought best when he was with them in person. Sheridan always made the most of this fact, which is as true now as it was in ancient times.

While the Valley of the Shenandoah was of no earthly importance to the Government as a line of communication or a source of supply in suppressing the Rebellion, it was of the greatest importance to the Confederates, both as a granary and a thoroughfare for the invasion of the North. To destroy or drive out of the Valley the army of Early, and to render the Valley untenable for any army not carrying its supplies with it, was the problem to be solved by the Union commander in the summer and fall of 1864. How well he did this, the facts that the country was overrun by our troops during the harvest of 1864, and that the following seed-time found no one in the Valley to plant seed or care for the crop, must testify.

It is not necessary here to enquire into the reasons for the habitual failures of our armies in the Valley before this time. They may have been, and in part were, undoubtedly due to the want of numbers, and at other times to the quality of the troops, and always more or less to the character of the army commanders. It is enough, in so far as the record of the campaign chronicled in Mr. Pond's book is concerned, that the success of the Union arms was unvarying in quality, if not in quantity.

It has been claimed that Mr. Pond does not give specifically the numbers of the troops engaged on the two sides in the different battles in the Valley. This question has been thoroughly discussed and set at rest by the chief actors interested. The Confederates started out in the war with the boast, and in many cases an honest belief, that one Southerner could beat five Northerners. They were cured of the belief, but they adhered with pardonable vanity to the boast, and in order to prove the statement oftentimes understated their numbers. There was no more bigoted believer in the capacity of the individual Southerner for war than Early; no more unscrupulous falsifier of returns to establish this character than the Confederate commander in the Valley. It is certain that Lee, as a Virginian, had the highest appreciation of the importance of the Valley to the Confederate cause; and to say the Confederates under Early were reduced below the strength of the forces under Sheridan would reflect small credit on the Confederate Commander-in-Chief. The fact is that Lee had reinforced Early beyond what was usual in the hope that he could again transfer the theatre of war from the vicinity of Richmond to that of Washington.

At any rate we may regard it as an inspiration that Sheridan and his command were detached from the Army of the James and sent to the Valley. Hard work, a hot summer, and the malaria of the Dismal Swamp, where the cavalry command was on duty, were beginning to tell on the health of both officers and men, and the prospects for successful work for them in that field were much reduced. How well they did, after the transfer, the history before us tells, for from the battle of Winchester to the final dispersion and capture of the Confederates at Waynesboro, the career of the Union Army in the Valley was a continued success.

Mr. Pond's history is in every way worthy of the events it rehearses, and he deserves the credit that is due to the completion of the best book of the series to which it belongs.

M.

KELTON'S "ANNALS OF FORT MACKINAC."*

"To help pass the long dreary evenings of a Mackinac winter were compiled the following 'Annals,'" writes Lieutenant Kelton. Whatever may have been the motive, the result of his labor is a collection of valuable historical and genealogical data relating to a romantic region and a variety of people. Interspersed with the more practical data are Indian legends, and interesting accounts of the origin of the curious names formerly applied to some of the Western lakes and rivers.

The book—an unpretending duodecimo—also contains copious extracts from the civil and ecclesiastical records of the "*Isle et Habitation de Missilimakinac*" from 1725 to 1882. The earliest visitor of note was Père Allouez in September, 1665. The earliest recorded commandant of Fort Michilimackinac (as it was then called) was M. de

* *Annals of Fort Mackinac.* By Dwight H. Kelton, Lieutenant, U. S. A. Chicago: Fergus Printing Co. 1882.

Blainville, 1742; the first English commander was Major A. S. de Peyster, 1774–79. The first American commanding officer was Major Henry Burbeck, of the Corps of Artillerists and Engineers, 1796. Among the names of those afterwards stationed here are noted: Hunt, 1st Infantry, 1801; McNeil, 5th Infantry, 1816; Pierce, Corps of Artillery, 1817; Lawrence, 2d Infantry, 1819; Wm. Whistler, 3d Infantry, 1823 and 1833; Hoffman, 2d Infantry, 1825; Dr. Satterlee and C. A. Waite, 1825; E. V. Sumner and S. P. Heintzleman, 2d Infantry, 1827; S. Burbank, 5th Infantry, 1828; E. M. Brooke, 5th Infantry, G. W. Patten, 2d Infantry, 1832; J. H. Leavenworth and John Clitz, 2d Infantry, 1834; J. V. Bomford and M. R. Patrick, 2d Infantry, 1835; Harvey Browne and S. C. Pemberton, 4th Artillery, 1840; P. H. Galt, G. W. Getty and W. Chapman, 4th Artillery, 1841; Martin Scott, 5th Infantry, 1842; S. Casey, 2d Infantry, and F. Steele, 5th Infantry, 1845; W. N. R. Beall, C. H. Larned and H. Dryer, 4th Infantry, 1848, and many others. The total number of officers U. S. Army stationed here, 1796–1882, is 187. The book is illustrated with a number of wood-cuts. It is not improved by the somewhat confused arrangement of the contents, nor the occasional resemblance to a tourist's guide. It would be well, however, if the history of all the older military posts should be written by direction of the War Department. The tendency to concentrate our miniature army at a few points is shown in the abandonment of some of the Upper Lake posts and the proposed sale of certain military reservations. We are reminded that one of the latest and most charming novels † issued by the Harpers is based upon the early history of Michilimackinac. R.

FOR REVIEW.

War of the Rebellion. Official Records of the Union and Confederate Armies. Series I. Vol. VII. (Washington.) Government Printing Office.

Findings of the Court of Inquiry and Reviews of the Judge Advocate General and of the General of the Army, in the case of Major General G. K. Warren. (Washington.) Government Printing Office. 1883.

Affaires Militaires. Discours prononcé par M. Frère-Orban, Ministre des Affaires Etrangéres, dans La Seance Due Février, 1882. Bruxelles. 1882.

La Nouvelle Revue. (Paris.) January, 1883.

Annual Report of the Adjutant General of Pennsylvania for the year 1882.

A History of the People of the United States from the Revolution to the Civil War. John Bach McMaster. Vol. I. (New York.) D. Appleton & Co. 1883.

† *Anne.* A Novel. By Constance Fenimore Woolson. Illustrated. New York: Harper Bros., Franklin Square. 1883.

OUR EXCHANGES.

[Comprising reprints or translations from important articles on military topics.]

"Organ der Militär-wissenschaftlichen Vereine" (Vienna), Vol. 24, Nos. 4 and 5.

A number of the articles, whilst naturally of greater interest to the European military student, contain valuable military lessons, or, at least, tend to strongly impress the importance of well known military precepts.

Lt. Col. von Hugo Bilimek, of the Imperial General Staff, in "*Relation between the Operations and the Commissariat in the Campaigns of* 1848 *and* 1859 *in Italy*," points in detail the difficulties under which the Austrians labored owing to the insufficiencies and mistakes in the means and methods for the supply of the troops.

Whilst the Austrian plans of campaign appear to have been carefully prepared and digested as early as Nov. 15th, 1858, attention to the all-important matter of providing food and means of conveyance for the same, for a large army about to move into a hostile country, appears to have been left at "loose ends." Even existing regulations in the matter were neglected, and on April 28th, 1859, the day preceding the entry into Piedmont, the corps were supplied with only one-half of their allowance of wagons. The wagon trains were unskilfully managed, needlessly marched and countermarched. Partially in consequence of this it was frequently found impracticable to establish field bakeries sufficiently long to bake the bread required by the troops. The wagons to be used with each battalion, to transport its immediate supply of food, were diverted to other purposes. The troops were frequently obliged to make long marches, and even go into battle without a previous proper supply of food or without the time to prepare it.

The history of Austrian wars presents continued repetitions of mistakes in this respect, as also in the general mismanagement of the commissariat. The battle of Wagram is mentioned as an instance which should have served as a warning example. The troops were obliged to leave camp without the opportunity of preparing breakfast and fought thus, without food, during the entire day.

The campaigns of 1848 and 1859 indicated a singular inability of the Austrian authorities to profit by the previous bitter experiences, and the armies were unable to utilize such advantages as might have been gained by superiority of position or forces. Even if they had been successful at Solferino, it is claimed that the fruits of victory could not have been gathered, as the supplies at hand were insufficient to warrant an advance of the army.

The French claim that both after Magenta and Solferino they were unable to vigorously follow up their victories owning to the lack of supplies of food, and in the last case, of transportation for the commissariat; but the author inconsistently writes that Napoleon I. would not have abstained from following up his victory for the want of wagons, notwithstanding his frequent statements that the Austrians were prevented from utilizing advantages presented to them for the same reason. The article is exceedingly interesting and valuable in pointing out the absolute necessity of a thoroughly organized and well equipped commissariat, ready at the outbreak of war to meet all possible draughts upon it; that this cannot be improvised in a moment, particularly when brought face to face with the enemy. As it is the *sine qua non* of complete military success, no expense of money, material and forethought is too great to be paid for human approximation to perfection in its material and organization.

Capt. Spaleny, in "*Observations and Experiences during the Occupation of Bosnia*," mentions the advantages of visual signalling in a mountainous or hostile country, when in advance of or when impracticable to establish, the electric telegraph.

Maj.-Genl. Carl von Sonklar proves the right of designating Italy "*The Bloodiest Piece of Earth in Europe*" by citing 585 actions, of which 205 were pitched battles. Of these 371 were north of the Po and 214 south of it.

Capt. Otto Maresch, in "*Comparison of the Field Artillery Systems of the Great Powers of Europe*," makes a comprehensive analysis of the artillery systems, considering each important element separately, and presenting the data in each instance, in tabular form.

The paper is of value to the artillerist, and it is to be regretted that it cannot be here given in full. The maximum and minimum values of some of the important elements will be given.*

It appears to be settled that two calibres are required, and these calibres are generally taken in the proportion of the relative strength of infantry and cavalry. Russia and Italy have, however, about equal proportions of the light and heavy calibres, whilst the others range from 11.6:1 to 6:1. (G. and A.)

The light calibres range from 2.95″ to 3.43″ (I. and R.). The heavy calibres from 3.43″ to 4.2″ (A. and R.)

The elements of efficiency affecting the initial velocity, consisting of the powder-charge quotient, gas-checking means of the projectile, twist of rifling and length of bore, are naturally considered first. The relation of weight of charge to weight of projectile lies generally between $\frac{1}{4}$ and $\frac{1}{6}$ (G. and I.) It is to be noted, however, that the French use as high as $\frac{1}{3.66}$ in the l. c. With the exception of England, all use the compressive system of projectiles. The twist is uniform, except in the R. and F. systems, where it is increasing: it varies from 3°35′ to 7° (S. and F.). It is to the *right* in all cases except in the I. The length of bore varies from 46.4″ to 66.5″. The importance of the relative values of sectional densities $\frac{P}{Q}$ (weight of projectile in grammes divided by area of cross-section in square centimetres) is shown in the following table of elevations and ranges:

Calibre.	$\frac{P}{Q}$	Ranges of 1,094 yds.	2,187 yds.	3,281 yds
G. 8cm.	104.7	1°–30′	3°–49′	7°–15′
A. 8cm.	97.6	1°–53′	4°–49′	8°–49′
E. 9Pdr.	90.3	1°–55′	5°–20′	10°–14′

Only the last two are strictly comparable, the initial velocities being the same, 1381′. In the G. 8cm. it is 1525′. The maximum sectional density is 142 (R.h.c.)

The lengths of projectiles vary from 3.16 calibres to 2.41 calibres (E. 13Pdr. and A. 9cm). The weights of projectiles of the h. c. vary from 14.03 lbs. to 28.37 lbs. (A. and R.), and of l. c. from 9.54 lbs. to 15.14 lbs. (A. and R.).

The value attached to different classes of projectiles is shown by the relative number carried. Shell are preferred by all but England and Russia, these preferring shrapnel. In the first instance, the proportion of shell to shrapnel is from 2:1 to 3:1 (F. and A.), whilst in the latter case the relation is reversed, ranging from about 1.2:1. to 2:1 (R. and E.). All but the French have the Austrian type of ring-shell, the French having the single walled and the English both single and double walled. The Russians have a new system (Babuschkin). All shell are provided with percussion fuzes, which are modifications of the German construction of 1873.

The proportions of bursting charge to weight of shell vary from .029 to .069 (A, 9cm and E. 9 Pdr). The limits are thus between $\frac{1}{34}$ and $\frac{1}{16}$. The number of pieces upon bursting range from 80 to 100 in l. c. ring shell to 100 to 150 with h. cs. The French, however, give only from 70 to 80, whilst the English muzzle-loader produces only about 36 pieces. The number of ball enclosed in shrapnel varies from 63 to 290 (E. 9Pdr. and R. 10.67cm). Canister are carried in proportion, ranging from 1:78 to 1:14 (F. and A.) They are essentially similar in construction, varying only in the number of enclosed ball, which range in the l. c. from 61 to 340 (F. and E.), and 76 to 226 (G. and I.) As different weights and forms of projectiles necessitate different elevations for the same ranges, and hence different sights, all are now endeavoring to reduce the different classes of projectiles to uniform weights; the Austrians alone carry incendiary shells or carcasses.

The maximum ranges of shell considered in the range tables of the l. c. vary from 3,828 to 7,655 yds. (E. and F.), and with the h. c. from 4,046 to 7,655 yds. (E. and G. R. F.). The author considers the value of ranges beyond 4,375 yds., at most, illusory, owing to small degree of accuracy attainable.

The maximum effective ranges of shrapnel of l. c. vary from 2,461 to 3,172 yds. (A. and I.); of h. c., 2,461 to 5,468 yds. (A. and F.)

The weight of gun and carriage of l. c. varies from 1,691 to 2,381 lbs. (A. and E.); of h. c., from 2,112 to 2,956 lbs. (G. and E.) The l. c. carriages admit of elevations of

* To save space the following abbreviations will be used: l. c., light calibre; h. c., heavy calibre; A., Austrian; G., German; R., Russian; F., French; I., Italian; E., English. These abbreviations will be placed in an order corresponding to the data as given. Designation of guns, when referred to, and expressions for sectional density, will be given, as in the original, in metric values. Ranges and dimensions will be given in English measure.

18° to 26° (G. and F.); depressions, 4° to 15° (E. and G.); h. c. carriages admit of elevations of 16.5° to 25° (G. and F.), and depressions of 6° to 16.5° (F. and G.). The relative weight of l. c. guns to carriages varies from 0.639 to 0.877 (A. and R.); of h.c., from 0.815 to 1.078 (I. and R.). The Russian carriages are in both cases the heaviest.

Elevations are given by the single and double screw. But the French, in order to be able to make rapid changes, connect this with a double eccentric, so that it is possible by a single movement to pass from high to low angles and vice-versa.

In order to reduce both the violence and distance of recoil, the Russians have adopted a recoil absorber or buffer, the upper part of the carriage and gun having a limited independent motion, on the lower portion consisting of the trail and wheels. A steel spike or blade is attached to the bottom of the trail, which, pressed into the ground, reduces the distance of recoil. The number of rounds carried per gun in the l. c. varies from 148 to 165 (E. and R. F.); in the h. c., from 100 to 148 (E. and F.) The caissons carry from two to three times the number carried in the limber chest of the piece.

French batteries are provided with telescopes, range finders and compasses—the latter being used for indirect fire. Italian batteries have the Gautier telemeter. The author fails to note the use of telescopic sights in any service.

For long ranges requiring high elevations a plumb-bob and line are used to give the direction. It is not to be wondered at, therefore, that long range firing is necessarily considered uncertain as to accuracy.

The author, in the closing comments, states that the Austrian field artillery fulfills in a high degree all artillery and tactical requirements, and it is equal to all, and even surpasses some, of the other systems considered. The French guns are, however, acknowledged to be superior in effective range, terminal velocity and living force, dangerous spaces and accuracy; but the cone of dispersion of their shell is not satisfactory—the 80^{mm} gun suffers from excessive strain upon firing, and the 90^{mm} has too great weight for necessary mobility. The other systems, except the English muzzle-loader, form with the Austrian a nearly similar group.

Progressive theoretical knowledge and technical development has brought about a very sensible similarity in all important elements of the artillery systems. This uniformity becomes apparent in the general uniformity of details of material and methods of firing and practice.

It is difficult to determine in what direction further development of field artillery will take place in the immediate future. For the gun, obturation and firing methods demand attention. For the carriage, a brake and special chest for canister would be desirable. Even a slight increase of sectional density of shell would be advantageous, and if by this means shell and shrapnel can be brought to the same weight, the sights and range tables may be simplified.*

Not the least valuable of the contents of this number is a *classified index of the contents of all of the leading military periodicals published in the civilized world*, during the six months ending in December, 1881. Such information is of value to the military student who is interested in obtaining material for special lines of investigation.—E. L. ZALINSKI, Fifth Artillery.

Ordnance Notes No. 234 (Washington), consist of "*Some Thoughts about the* "*Future of Our Army*," by Gen. S. B. Holabird, Assistant Quartermaster General, U. S. A.

This paper deserves a wider circulation than it is likely to get in its present shape. So far from agreeing with those who affect to believe that the necessity for the employment

* The reviewer would suggest the following as probable in future developments of field artillery: Slower powder will be used, in increased charges; the bore will be lengthened, whilst the thickness of the metal at the breech will be reduced, there being no material reduction of weight, but a change in its distribution. There will be a material increase of initial velocities, and consequent increased flatness of trajectory and range. The use of a metallic cartridge case, containing, in a well countersunk recess, the means of ignition by percussion, similar to small arms cartridges, but with the projectile not attached. This will simplify the question of obturation, making it more complete, and reduce the chances of misfire. It will do away with necessity of an open vent and use of primers. The use of such a case will make it more desirable to use the French screw breech block, or similar methods, than the Krupp wedge, as it will be easier to eject the case after firing with the former. The resulting velocities will be more uniform, as, if properly made, the powder will be protected from variations of hygrometric conditions. Projectiles will combine the compressive bands and expansive sabots to serve as gas-checks. Increased sectional density will be obtained by lengthening the projectiles materially and the twist will be increased. Greater attention will be given to conditions of wind and temperature as affecting direction and range. Improved telescopic sights will be more generally used for long range firing. The carriage will be so modified as to enable the gunner to make slight changes of direction, whilst sighting, unaided. Light batteries will be made measurably independent of supports by being provided with at least two light machine guns.—E. L. Z.

of soldiers in national defense is about passing away, General Holabird claims that, "so long as 'wealth accumulates and men decay,' there will be something worth fighting "for; something not only worth protecting, but that must be protected." After sketching the reason for the maintenance of large standing armies in Europe, he briefly reviews the necessity for a small permanent military force in this country after the Indians no longer require watching, as he says: "Industrial nations that lay aside arms and cultivate "alone the arts of peace, will in time simply invite the spoiler. While man remains "what he is we may infer that national safety exists solely in the recognized power of "competent armed self-defence. * * * In our comfortable but modest "homes for many years we have spoken with pity of the brigand-ridden parts of Italy, "Greece and Mexico, but as we are becoming rich, and are pushing out unguardedly west-"ward for the precious metals and their attendant belongings, we find that the chalice is "placed to our own lips. Our express wagons are robbed of their treasure, and so are "passenger trains upon our railways; but we turn down the names of the plunderers in "in order to save our pride: we call the robbers road agents, James boys, Taylor boys, "cow-boys, filibusters, and endeavor to avoid the disgrace of the matter by calling these "affairs local. They were local in Sicily, in the Abruzzi, Roumelia, in Greece, and "possibly in Mexico. Something must be done eventually to keep down such disorders, "which will increase with population and in the accumulation of wealth. In other "countries it has required soldiers. * * * It is not convenient nor wise to "withdraw skilled workers from the great marts of trade and the workshops of a nation, "on every occasion that may arise, to defend social security, nor to protect even the soil. "A just division of labor will indicate a certain percentage of the population upon whom "the duty of watching while the others work should fall. 'Situated as this people is, far "removed from the great armaments of Europe, with constitutional governments on either "side, there is little immediate danger to be apprehended from invasion. Still, the time "must come when a nation like this one will be driven by self interest, to adopt a policy "which at times may give offense and lead to unexpected hostilities.' * * * "We ought to hope that a war with the mother country may prove an impossibility, and "such it would be did it rest entirely with the people of the two countries: but govern-"ments are different. * * * In such a final struggle for commercial suprem-"acy we may hope that the youngest nation will be sure finally to win. * * * "It would be a mistake therefore to war upon the colonies of England; their interests "and our own are identical. Her conquests alone should be attacked, * * * "unless the mother country should make use of their territory as a base of operations "against this country. * * * All the valuable coal deposits upon the Pacific "coast lie mainly within British territory, and in the Winnipeg Valley is spread out the "great wheat belt of the future. It is well in war to aim not only at what seems to be "the most easily reached, but also at what is of the greatest value to hold when once "acquired."

Omitting Gen. Holabird's comments on the infantry and artillery soldier of the future, an extract from his views as to the requirements for our cavalry, which he thinks should number from 5,000 to 7,000 men. "Such a force, in the nature of the case, must "be the most expensive of all others named, but so long as its services are needed it is by "all odds the most valuable of them all. In the idea of being mounted there is found for "the soldier some compensation for the greater hardships, exposure, and the more trying "character of the service. It is truly a laborious, hazardous, but most honorable and con-"spicuous one.

"The horses, however, cost the Government, first and last, almost as much as the men. "The equipments of both horses and men are expensive in their nature, and the wear and "tear of men, animals and material is enormous. For cavalry service the quantity of "transportation and its cost are also due to the efforts to furnish forage for the animals at "remote places. This movement of forage must be guarded, and therefore, in order to "protect trains of supplies, more or less infantry must be associated with cavalry in our "service to secure its greatest efficiency. For, besides its forage and trains of supplies, "which require protecting, its spare horses and materials and depots should be taken care "of by foot troops. Its extra duty should be performed by details from footmen, and its "troopers be made to devote their time exclusively to their drill and the care of their "horses and equipments, and to the duties of active service. Cavalry companies thrown "out upon the plains cannot properly hut or quarter themselves and at the same time do "their proper duty. It is economy to supply cavalry troops with everything necessary for "constant action, at the same time putting them under officers who delight in the continu-"ous performance of their legitimate duty. It is evident at a glance that cavalrymen and "officers should be young and active, and thoroughly skilled in the management of their

"horses. It would be of manifest advantange to have troopers as far as practicable under "thirty years of age, captains and subalterns under forty, and field-officers even under fifty. "For cavalry service it is believed well-grown young men might be enlisted from seven- "teen to twenty-five, and at that age it would be best for recruits to stop, but not with "re-enlistments.

"The cavalry arm generally requires and ought to receive a more liberal allowance, in "some respects, of clothing than other soldiers. It would seem just and proper to increase "such allowance over and above artillery and infantry, say something like five dollars per "annum. And as it is almost impossible for cavalry to obtain or be furnished with fresh "vegetables, it would be a good thing to give them an increased allowance also of beans, "bread, rice, and coffee, and when possible an allowance of pickled vegetables. If we are "to have cavalry at all, it ought to be kept in the most efficient state possible under the "circumstances in regard to food, clothing, and equipments. Medical officers doing duty "with cavalry troops should be young men, competent to be with the companies upon all "armed service.

"Too great attention cannot be given to the horses for cavalry; to their condition, "and to remounts, and to whatever tends toward a perfected ideal cavalry service. Our "cavalry, while serving on the plains of the great West, should be quartered in the best "manner. All its quarters, barracks, warehouses, shops, stables, and corrals should be "constructed for its use ready to hand, and, as we have said, independent of it. Cavalry- "men should not be put on extra duty for any purpose whatever. In its ranks should be "cultivated such a spirit that the best youth of the land might be disposed to join it to "seek adventurous or attractive service, regarding it as a pleasure as well as matter of "soldierly pride to belong to it. In its ceremonial parades there should be kept up all "the "pomp and circumstance" of a glorious military show. The idea of duty should be "supreme, and that of cavalry, to be worthy of its name, must always be mounted duty. "To do any other than mounted or military duty comes short of a perfect service. A "cavalry thus trained would stand first in the estimation of infantry or artillery associates. "It is only when cavalry is relieved from post duty, and the men lounge around void of "spirit or love of legitimate mounted service, that it is felt to be unequal to what is gener- "ally claimed for it.

"It is not necessary, perhaps, to add that we now have some cavalry regiments that "fairly meet these requirements, and were the Government in some respects more liberal, "or its liberality better directed, all might be counted in that designation. But what can "be more discouraging to an officer than to have his men detailed on extra duty away "from his company to build barracks, open roads, etc.; or what more disgusting to the "men themselves than to have all this drudgery added to their otherwise severe and most "exacting duties as mounted men?

"Because men are to be kept mounted, it does not follow that our troops ought not to "learn to fight on foot. They must be equal to any demand the nature of the service "requires on foot or horseback; and if not up to such a standard, the lessons of the late "war and of Indian service on the plains have been lost sight of.

"As it is difficult to load a weapon on horseback, repeating and magazine arms are, "in the nature of things, required for cavalry. As much fewer shots take effect on horse- "back, more of them are needed. The moral effect on the cavalryman who uses a maga- "zine gun ought always to be considered. The weapon which the soldier himself esteems "and values most highly, as he is the one to use it, ought to be given him—especially "whenever he becomes duly instructed and competent to make good use of it. Whatever "arms are furnished, however, there can be but one opinion as to the necessity of the men "being trained to the highest point of efficiency in their use on foot or horseback. If a "saber be used, the men should fence constantly with one made of wood, as heavy as the "regulation one, until noted for their individual skill in its use. To shoot well, at speed, "from horseback with the pistol ought also to be esteemed as more than an accomplish- "ment; it should be a duty.

"Thus much in regard to a permanent armed force which shall meet the absolute "requirements of this country as at present situated, and as it will, so far as we can foresee, "remain for a considerable period. Its total aggregate need not exceed thirty thousand "men, namely, fifteen thousand infantry, five thousand artillery, and from seven to ten "thousand cavalry."

This extract from General Holabird's paper is concluded with one or two selections bearing with all the force of maxims upon certain attributes and aims of the Military Service Institution of the United States.

"In such a service as we have indicated, the highest ideals in every arm ought to "be reached. All the science attained and the experience gained and the traditions of

"every corps ought to be made matter of record, and carefully preserved among the valu-
"able data of the nation, secure from fire and the depredations of thieves. Its members
"and those interested in its success ought always to be on the alert to collect from home
"or abroad whatever can be of use to its service." * * *

"This business of collecting data is a duty to be fostered in every reasonable way;
"and every member of any arm or corps should wish his arm or corps to lead in all
"things that constitute the science of making good soldiers." * * *

"Upon the principle that that government is best which governs least, so that gov-
"ernment is best which feels obliged to withdraw the fewest of its subjects from their
"fields, their mines, their shops, their manufactories, their counters, desks and homes.
"* * * Whatever martial spirit is required by such a people, however, must be
"kept alive among themselves. It will furnish food for thought, study and amuse-
"ment. * * * Thus we believe may be cultivated something of the military
"art at home, as it were. * * * Thus, too, the love of country will be kept
"alive, along with a patriotic willingness to defend it when in jeopardy." R.

The Memorial de Artilleria for February, 1883, describes the comparative trials of the de Bange, Freire and steel-ring obturators. The de Bange consists essentially of a disc composed of asbestos and tallow, surrounded with cloth, and faced and backed by tin cups with copper corners. The posterior surface bears against the breech block; the anterior is in contact with a steel cylinder, having a rounded front called the mushroom, which it resembles in form. The stem of the mushroom passes through the disc and breech block, its axis being perforated to form the vent.

The Freire obturator has a ring, with its exterior surface in contact with the bore, the interior being a hollow conic frustum, in which the head, also conical in shape, plays. The head has connected with it a stem, which passes through the breech-block, and contains an axial vent.

The mushroom of the de Bange, when forced back by the powder gases, expands the disc laterally till its firm contact with the walls of the chamber prevents escape of the gases. The head of the Freire, under similar circumstance, expands the ring, the degree of expansion being accurately regulated by the space between the rear face of the head and the front of the breech-block.

The steel ring obturator was of the ordinary Broadwell pattern.

As a result of the trial, the steel ring was found to be inferior to the other two obturators, and the Superior Executive Committee (Junta Superior Facultativa) gave preference to the Freire system. C. S.

The Journal of the Royal United Service Institution (London), No. cxviii., contains among other valuable and interesting papers one of especial interest to the military and the medical professions. It was read by Litton Forbes, M.D., F.R.G.S., who was Surgeon Major and served in Turkey during the Servian War. It is entitled, "*On Certain Conditions of Sight which Affect Accurate Shooting.*" We give a few extracts. Doctor Forbes begins by saying that:

"I propose to confine myself almost exclusively to certain of those less obvious
"defects of vision which there is reason to believe are in many cases unknown and even
"unsuspected by those who suffer from them. * * * I shall confine myself
"mainly to those, I believe, not uncommon conditions of sight in which the eye as an
"optical instrument is imperfect, indeed, yet not so imperfect but that the routine work
"of daily life can be carried out without the adventitious aid of spectacles." After pointing out the principal forms of defective vision, such as *presbyopia*, or "old sight," *hypermetropia*, or "long sight," *myopia*, or "short sight," and briefly explaining their characteristics, the lecturer gave some curious statistics with particular reference to short-sightedness which he claims is especially to be found in recruits from urban districts. In the class of conscripts in France for the year 1878, out of 3,357 total rejections for bad sight, myopia accounted for 511; and in 1879, for 378 out of a total of 3,468. To understand the full significance of these figures we must bear in mind that the standard of vision in the French army is exceptionally low. Thus, while Germany requires from her recruits for general service an amount of vision not less than half the normal amount, and while England requires somewhat less than Germany, France is satisfied with a quarter. Now these high degrees of myopia are comparatively rare. The lower degrees are far more frequent relatively. For one man who possesses, say, one-tenth of myopia, there will be at least half a dozen who will possess amounts less than this, say, from one-twelfth to one-sixtieth, seventieth, eightieth or even still less degree.

"Now it is exactly with these very low degrees of short sightedness that we are "most concerned. * * * While no country would exclude a recruit because "he possesses a fortieth of myopia we shall see that this amount, if uncorrected, would "almost incapacitate for long range shooting. By this expression I do not mean altogether "shooting at a target a long distance off. I mean rather that faculty of quick and ac- "curate sight which enables a man to judge distances correctly and to fire quickly, which "enables him to take in at a glance the salient features of distant objects. * * * "Dr. Girard Fenlon, of Paris, from a series of experiments, concluded that a physiologi- "cally acute eye, which was myopic only one thirty-sixth, lost thereby about half its faculty "of vision. Prof. Nöel, of Louvain, perhaps a more accurate authority in this matter, "states that acuity of vision useful for distant objects varies between two-thirds and two- "fifths for a myopia inferior to one forty-second; it is below one-fourth from one-thirtieth to "one-twentieth, which are the limits accepted in recruits in this country, and for a myopia "of one-sixth to one-fifth, such as is allowed in the French and Italian armies, distant "vision is only one-thirtieth of what it should be. * * * It is impossible to "help inquiring what sort of shooting a man on active service would be likely to make "with an arm of the Martini-Henry's type, when possessed only of one-fourth of normal "vision. * * * I have already referred to the fact that by many oculists the "hypermetropic eye is considered an undeveloped form of eye. Conversely the short- "sighted eye may be considered an over-developed eye. Certain it is that much of the "ordinary work of civilized life tends directly to the production of this over-development, "or in other words of short-sight. This fact has been brought out very clearly by the "researches and observations of Dr. Cohn in Breslau, Drs. Agnew and Loring in New "York, and Dr. Erismaan in Russia. Dr. Cohn, with Teutonic patience, examined the "eyes of 10,060 children, among whom he found that 1,004 were short-sighted. But "what was more important, he found also that the short-sightedness increased steadily "both in the relative number of cases and in degree as he ascended from the elementary "to the higher classes. Dr. Loring, of New York, carried out a similar series of experi- "ments on the students of one of the largest Universities in the United States during the "graduation period of four years. He found that in a given number of individuals, each "successive year of study added to the number of short-sighted persons, or increased the "degree of the defect where it already existed. Now the whole tendency of modern life "is in the direction of those employments which are calculated either to produce myopia "or to aggravate it if already existing. Education is now carried on at a high pressure "without much regard either to the eyes or the bodily health of the disciples. * * * "There is an increasing dislike to occupations requiring manual labour and a corre- "sponding desire for those entailing head work. Nor is this condition of affairs likely to "be materially altered in the course of succeeding generations. On the contrary, as the "struggle for existence becomes intensified, and as the process of centralization, which is so "marked a characteristic of this age, becomes more developed, so may we expect to find "that the number of those employed as clerks and penmen, or at sedentary occupations "generally, will increase relatively faster than the population itself. Reason and analogy "both go to show that one direct result of all this will be a very considerable increase of "short-sightedness among those classes which, in England at least, have heretofore en- "joyed a comparative immunity from it. As a rule volunteer corps are chiefly recruited "from these very classes, and therefore the existence of any great increase of short- "sightedness among them is a matter for serious consideration. Much can be done in "the way of prevention and much also in the way of cure. But I am of opinion that the "first symptoms of the advent of short-sight should be carefully looked for in young "recruits, and when detected should be at once treated by suitable glasses. These should "be worn as a matter of course on all occasions when the rifle is handled, and more "especially at distance-judging drill and target practice. The education the eye will "thus receive will be invaluable for practical purposes, and in this way only can a "short-sighted man ever be made into a good or useful marksman." * * * *

In considering "how the acuity of vision might be improved, while at the same time "the range of vision in all directions was not lessened, I have kept two objects in view. "One is to correct—that is, to remove—the actual optical condition which is the cause of the "impairment of vision. The other is to find an appliance such as may be worn at all times "and under all circumstances from the very day on which the recruit commences to learn "his drill. The first of these indications is fulfilled by the use of glasses which will exactly "correct the faulty condition of the eye itself. The sight should first of all be carefully "tested and the nature and degree of the impairment of vision be accurately measured. "This will in many cases be sufficient, and if the glasses thus found be constantly worn "nothing more will be needed. The principle of the pinhole aperture," (previously

described) "is, however, an excellent one, and should if possible be preserved. In order "to do this without unduly limiting the field of vision, I replace the metal disc by a disc "of colored glass perforated by a stenopical aperture. This aperture admits white light, "whilst the remainder of the glass allows only colored rays to pass through. The result- "ing contrast by a well-known optical law serves the purpose of an opaque disc, without, "like it, completely abolishing all but central perception. Having thus corrected the error "of refraction to which the impairment of vision is essentially due by a suitable glass, and "having also by means of the contrast between the white and colored rays secured the "main advantages, without the drawbacks, of the stenopaeic disc, it remains only to unite, "if possible, in one appliance this double gain."

In our Army the standard of vision is very much higher than in that of any of the European Armies mentioned by Dr. Forbes. A recruit is very carefully examined in regard to his sight, and is required to read No. 20, Snellen's Test Types, or the dotted card furnished by the Medical Department (which is practically the same thing) at a distance of twenty feet.

He is also carefully examined for color blindness. Cases of presbyopia, or "old sight," are found among old soldiers, but it is rare indeed to find a defect of vision among the younger men.

With regard to the use of glasses, we agree most heartily with Dr. Forbes in the belief that their adoption by the Volunteer arm of our service, the National Guard, would be followed by great benefit; but in the Regular Army they are not needed, and it would be practically impossible to adopt such a remedy were it necessary, as the greater portion of the Army is located in the distant Territories of the West, where the means of obtaining or repairing glasses are poor indeed, and where the nature of the service itself is such that a man would not undergo the inconvenience of glasses could it possibly be avoided. P.

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Monthly Weather Review. Washington, D. C., War Department, to date.

Proceedings of the United States Naval Institute. Vol. VIII. No. 4. (Annapolis). 1882.

Van Nostrand's Engineering Magazine. (New York.) D. Van Nostrand. March and April, 1883.

Giornale di Artigleria e Genio. (Roma.) December, 1882.

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Journal of the Royal United Service Institution. (London.) Vols. XXVI. No. 18. 1882.

Kongl. Krigsvetenskaps-Akademiens Handlingar och Tidskrift. (Stockholm.) Jan. and Feb., 1883.

The Century. March and April, 1883. (New York.) The Century Company.

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The Army and Navy Register. (Washington.) Army and Navy Register Publishing Company.

The Sunday Herald. (Washington.) I. N. Burritt, to date.

CORRESPONDENCE.

[Comprising selections of especial interest to Members and the Military Service generally.]

PRIZE MEDALS FOR MARKSMANSHIP.

WAR DEPARTMENT,
WASHINGTON CITY, *February 15th*, 1883.

COLONEL:

Acknowledging the receipt of your letter of the 29th ultimo, expressing your desire to procure for the Military Service Institution of the United States copies of the prize medals awarded for army marksmanship, I have the honor to inform you that the Chief of Ordnance has been instructed to procure a set of the bronze copies referred to and forward them to the Institution named.

Very respectfully,
ROBERT T. LINCOLN,
Secretary of War.

COL. T. F. RODENBOUGH,
Secretary, Military Service Institution.

GREAT SEAL OF THE UNITED STATES.

MINT OF THE UNITED STATES AT PHILADELPHIA, PA.,
SUPERINTENDENT'S OFFICE,
January 30th, 1883.

SIR:

In reply to your favor of the 19th inst., I have to say I will forward to you a copy of the Great Seal Medal, with the correspondence in relation to the same between the Secretary of the Treasury and myself, as soon as I can have a copy of the correspondence furnished from the printer. I have the honor to remain,

Very respectfully yours,
A. LOUDON SNOWDEN,
Superintendent.

THE SECRETARY, MILITARY SERVICE INSTITUTION.

CONTRIBUTION TO THE LIBRARY.

LEGATION OF THE UNITED STATES,
Brussels, *February 14th*, 1883.

GENTLEMEN:

I take the liberty of sending a copy of the *Nouvelle Revue* (Paris), containing an interesting article on "The Neutrality of Belgium and Switzerland in case of War between Germany and France," to which I have added a copy of a speech delivered by the Belgian Minister of Foreign Affairs on Military Affairs, February 14th, 1882.

I beg you to accept these publications as a slight contribution to the Library of your Association with the regard of,

Yours very truly,
NICHOLAS FISH.

THE MILITARY SERVICE INSTITUTION
OF THE UNITED STATES.

PURPOSES FOR WHICH THE ARMY IS MAINTAINED.

HEADQUARTERS MILITARY DIVISION OF THE ATLANTIC,
New York City, *October 19th*, 1876.

[*Extract.*]

SIR:

In obedience to your instructions of the 4th of September, 1876, to forward to you, not later than the 20th of October, any opinion or suggestions touching the subject before the Commission for the Reform and Reorganization of the Army, I have the honor to submit the following remarks: What the strength, composition and organization of the army should be, depends on the purpose for which it is maintained.

A large standing army is against the settled policy of the nation. We rely on creating armies from our population when the necessity for them has actually arisen, or is impending. But "In Peace prepare for War" is an accepted and respected maxim among us. Under the operation of these somewhat contradictory principles we have been led to the compromise of a small standing army, which is expected to keep pace with the progress of the profession; construct adequate and suitable national defenses; hold some of our most important military positions; preventing their sudden seizure by an enemy; his occupation of our harbors and destruction of our great commercial cities; be prepared at all times to supply the national forces with the most improved weapons, implements and munitions of war, and to guard these and other public property until distributed for service; be ready at a moment's notice to organize, equip and supply, with efficiency and economy, armies of any magnitude which the occasion may call for; and lastly, to serve as a nucleus for the raw levies raised as needed. What, then, should be the strength, composition and organization of the army that it may best accomplish the objects of its existence?

Looking from the standpoint assumed, the first question which presents itself is the question of cost. What, during Peace, are the people able and willing to pay in the way of insurance, by military proficiency and preparation, against heavy loss in case of War? If *nothing*, then the Army as a permanent institution ought to be dispensed with. A discussion of the question arising from our Indian frontier is omitted in this connection. The Indian furnishes only incidental duty for part of the Army. The service is of secondary importance, and is comparatively temporary in its nature. It must for a few years longer occupy the attention of our cavalry and infantry, and some parts of the staff, and from time to time influence the strength and organization of these arms, but it is entitled to no weight in considering the question just proposed.

If the people are willing in Peace, as they have always shown themselves to be, to guarantee their own protection in case of War, by entrusting to an army the accomplishment of the objects hereinbefore enumerated, then the main question is closed, and the resulting ones of the strength, etc., of the force to be kept up are opened. * * *

I have the honor to be, very repectfully, your obedient servant,

W. S. HANCOCK, *Major-General*,
Commanding Division of the Atlantic.

THE HONORABLE J. D. CAMERON,
Secretary of War, Washington, D. C.

THE ARMY NOT ONLY TO WATCH THE INDIANS.

"I really think it is important that the idea that the Army only exists to keep the Indians in order should be pushed aside with a strong hand. It is fatal to any proper study and preparation, and before long the echo will return to plague us from Congress, for the Indian question will not last forever."—[*Extract from letter of an Officer of Engineers, February 18th*, 1883.]

SLOW PROMOTION.

"I hope every success for the INSTITUTION, and that it may grow in influence and power year by year. It strikes one, however, that something might be done by officers of high rank connected with it, to advance the interests of the Service in the matter of *promotion*, especially with regard to Lieutenants who came in about 66, and perhaps, a year or two after my time. As I figure it, * * * unless there should be a war, I could not possibly be promoted to a Captaincy under fifteen to twenty years from now, although within a few files from the top of the list; in other words, after a period of thirty years, at least, as a Lieutenant. * * * In all armies the subject of promotion is a very important matter with the respective governments. In England, for instance, an officer who has failed to become a Major at forty-five years is retired. In Italy officers are Colonels at about fifty, while in this country Congress looks on with perfect complacency upon *lieutenants* who have passed forty and fifty years of age in some cases. The youngest officers in rank have a right to expect that their seniors should make a fight for them, and if from the General down to Captains the cry was raised, it is possible that *something* might be done for the Army as regards promotion." [*Extract from letter of a First Lieutenant of Artillery, March 11th*, 1883.]

POSSIBILITIES OF THE INSTITUTION.

"If it becomes possible to have the rooms of the Institution in the city, a great good

will result, for they will then become in effect an Army and Navy Club, and a point of assembly for officers of both services. By the gradual accumulation of years a valuable library and museum will be collected in a place where it will be convenient to consult the one and inspect the other; and the advantages thus offered will become more apparent every year. * * * * With a room or rooms, centrally located in the city, you will see a large number of visitors, and it will become the thing to drop in after the business of the day is over, or at night. The army officer is a gregarious animal, but his gregarious instincts must be properly brought out. The Institution (in New York) will do so, because he will there meet others; will have a place to read or study, or consult an authority; and it will be a place where he can take a friend, and through the resources of the Museum, its maps, etc., can fight his battles over again, or add to his friend's knowledge of army life. A purely social club, depending for its existence on the desire for a dinner or a drink, or a game of cards, does not fill any void in the visiting officer—he can get them all elsewhere; but the MILITARY SERVICE INSTITUTION is something *sui generis*, and there he would be really at home."—[*Extract from letter of an Officer of Artillery, March 7th*, 1883.]

TRUE AIMS OF THE INSTITUTION.

"Nothing interests me more than the success of the 'MILITARY SERVICE INSTITUTION.' * * * The only hope rests in enlarging the stream of military science to stimulate the growth of principles, through our volunteer organizations, which reach the popular heart and patriotism of the people. Could all the military societies now used for hero worship be united in one educational, patriotic association, to advance our studies of military subjects, a bright intelligence would in future guide our people in the emergency of war, saving thousands of lives and millions of money; not to speak of the glory and credit of our free government. In the meantime this Institution is germinating a tree which may bear noble fruit." * * * [*Extract from letter of an Officer of the Subsistence Department, February 20th*, 1883.]

ENCOURAGING WORDS.

"The only Institution or Society—civil, military or religious—with which I have any connection, is the 'MILITARY SERVICE INSTITUTION.' Of that I have been a member for several years.

"The active members of the Institution are doing most excellent work for the advancement of military knowledge and science, and should receive from the army itself a more generous recognition and support than is indicated by the published list of members."—[*Extract from letter of an Officer of the Quartermaster's Department, March 12th*, 1883.]

THE INSTITUTION DESERVES FULL ARMY SUPPORT.

"The MILITARY SERVICE INSTITUTION deserves *full army support*. In no respect is it inferior to the British, and its publications are creditable to the zeal and scholarship of the Army."—[*Extract from letter of a Retired Officer, February 15th*, 1883.]

RECRUITS FOR THE INSTITUTION.

"Upon arrival here I found but one officer who was a member of the MILITARY SERVICE INSTITUTION. As an evidence of the merits of the 'Association,' it is only necessary to say, that within a month, *every regimental officer at this point has joined*. I hope to add to the list from other posts in a few days."—[*Extract from letter of an Officer of Artillery, March 15th*, 1883.]

THE INSTITUTION ON THE PLAINS.

"I send herewith, on the official blank, the names of three new members. Recruiting for the Institution seems to have taken a fresh start. Several personal letters have been received at this post from Eastern stations urging those who do not already belong to join at once. Some officers say that as they do not expect to get to New York for a year or two, they hardly see the advantage of membership in their cases. I tell them that the local benefits of the Institution are trifling compared to its greater objects, such as the dissemination of military information through the country, making

the army more popular; the opportunity for the discussion of professional questions in which officers on the Plains are as much concerned as those in the harbor of New York; that the youngest sub., if he has anything to say worthy of attention, or an invention or improvement to bring forward, can have its merits impartially discussed, and through the printed JOURNAL brought before the military world without personal expense. Besides, the valuable quarterly JOURNAL OF THE MILITARY SERVICE INSTITUTION is alone worth more than the annual dues. I think when these facts are thoroughly appreciated a very much larger proportion of the Army will join the Association. The subject selected for the Prize Essay of 1883 is a very important and timely one. It is to be hoped some one may handle it as successfully as its predecessors." * * * *
[*Extract from letter of a Medical Officer, March 15th*, 1883.]

REINFORCEMENTS FROM NEW MEXICO.

"I have the satisfaction of presenting the joint application of *ten* of the officers of this post for membership in the MILITARY SERVICE INSTITUTION, * * and hope that the efforts of others may be equally successful. Please send me two or three blank applications, as I hope to secure two or three more names."—[*Extract from letter of a Cavalry Officer, March 12th*, 1883.]

GOOD WISHES FROM THE PUBLIC.

"Some of the leading merchants of this city have expressed a wish for the success of the 'Institution,' its JOURNAL and the Military Service generally."—[*Extract from letter of an Officer of the Quartermaster's Department, February 15th*, 1883.]

OUR CAMP CHEST.

[Contributions of anecdotes, short sketches or other light matter are solicited for this Department.]

REMINISCENCES OF FORT DEFIANCE, N. M., 1860.

There was in garrison at Fort Defiance in 1860 a small force of the Third Infantry, consisting of Companies "B," "C" and "E"—138 officers and men for duty. Possibly, counting sick, extra duty men, civilians, and all, we may have had between 150 and 160 people capable of assisting in an emergency.

It will be remembered that in those days (and in some cases now) a frontier post was a "fort" only in name.

The stout hearts and arms, the good discipline and courage of its garrison, were its only claims to being a fortification. It had a parade, or plaza, usually square, surrounded by quarters, barracks, guard-house, prison, store-houses, and a miscellaneous collection of adobe, or log buildings; had a flag staff in the centre, but had no defensive works; and was in fact nothing but a mere military village. Its position was selected not with any view to defense—no attack being ordinarily dreamed of—but solely with reference to wood, water, grass, and shelter from the weather, and as a strategic point from which to operate against or to hold Indians in check. It was, but for its sentinels, as open for ingress or egress as any New England village. Such was Fort Defiance on the morning of the 30th of April, 1860. It was nestled amid the mountains, at the foot of Cañon Bonita, not far from the boundary line between New Mexico and Arizona, away up in the loneliest corner of the United States, in the "Navajoe country," and was important as a base of operations for protecting the settlements in the Rio Grande valley. It was the most remote and isolated post of its day—its loss would have entailed disaster to the people along the Rio Grande.

Captain and Brevet Major O. L. Shepherd, Third Infantry (now Colonel and Brevet Brigadier-General, retired), commanded the post. Assistant Surgeon Joseph H. Bill (now Major and Brevet Lieutenant-Colonel) was Post Surgeon. First Lieutenant William D. Whipple (now Lieutenant-Colonel, Adjutant-General's Department, and Brevet Major-General) was commanding Company "E." He was First Lieutenant of Company "B," but was in charge of Company "E" at the time, from the requirements of service. Second Lieutenant John McL. Hildt (subsequently Captain and Brevet Lieutenant-Colonel, and since deceased) handled Company "C." Major Shepherd's duties necessarily calling him from point to point, the immediate command of his Company ("B") was exercised by its Second Lieutenant, Wm. Dickinson (now Captain and Brevet Major, retired).

Lieutenant Whipple had entertained strong suspicions for some days that something more serious than common was in contemplation by our red neighbours, and, being officer of the day on the occasion described, had taken measures to insure extra vigilance and care on the part of the guard, and had also taken some precautionary steps as to the conduct of his company. A few moments after he had returned to his quarters from a very careful inspection of his guard and a visit to each sentinel's post, the attack was made.

But for his conscientious and thorough attention to his duty that night, and his personal, minute and thoughtful instructions to every man of his guard, our subsequent efforts might have been unavailing. As it was, the enemy was met by such prompt and efficient a resistance by the guard that the garrison had

time to turn out and take position. The place was surrounded by hills, and these were alive with Navajoes and Apaches. It has since been pretty conclusively ascertained that over 3,000 of them took a hand in this daring affair.

At 1 A. M. on April 30th, just as the moon had gone down, with the war whoop, they opened fire with rifles. The "long roll" sounded, the sentinels fired, and the garrison sprang to arms, with an unpleasant conviction that the savages probably had a detail at every officer's door to knock him on the head so soon as he appeared.

As I approached the company quarters, the First Sergeant gravely saluted, while a shower of balls were pattering upon the log building, and remarked pleasantly, "They seem to think they can take us this morning, Lieutenant;" but he had the men ready and waiting to do all in their power to prevent it.

The entire defense was monotonous and purely passive.

Lieutenant Whipple held the position near Cañon Bonita with Company "E," all the large Quartermaster's corrals and many store-houses being there. He had sent a Sergeant and squad of men to the rear of the line of officers' quarters, and with the bulk of his company "stood off" Indians enough to have packed his whole force on their backs, had their courage sufficed them to attempt it. The enemy's fire, while hot, was not very effective, and Whipple stubbornly held them at bay.

Lieutenant Hildt, with Company "C," held the group of buildings on the La Hoya road, including the sutler's store, the contents of which were a strong incentive to hard work on Lo's part for possession. Hildt, however, held his ground nobly, though his small command had a horde of the enemy rush up in their faces many times.

Lieutenant Dickinson had Company "B" on the east face, between the line of quarters and the steep rock hills, some 150 feet high. This line of rocks was alive with them, and all night the flashes of their pieces spangled the darkness all along his front. He had extended the company as skirmishers in a very long thin line, and had, by permission of Major Shepherd, who had accompanied him forward to reconnoitre, taken the men nearly to the foot of the hills, and there kept them all through, excepting one charge made which carried the stone house on the hill. The men behaved most admirably, and all seemed to enjoy the excitement.

As before remarked, the fight was monotonous. Charges firmly and quietly met by careful file firing were rolled back, but were often repeated. As morning broke Major Shepherd assumed the immediate conduct of his company, and having given like orders for simultaneous movements by Lieutenants Whipple and Hildt, he caused the whole garrison to move forward and outward, and the affair was ended.

The Navajoes fled. The whole country round about, when we had charged up the hills, was alive with the baffled savages running for their ponies and thoroughly demoralized. We had no cavalry at the post at the time, so not much pursuit was made, and soon after sunrise recall was sounded. The evening before I had been bitten on my nose by a vicious small dog of Dr. Bill's, and as "B" Company rallied on where I was standing, "Paddy Martin," a little Irish Corporal, and a good soldier, exclaimed, "Och, thin, Liftinant, did yez get scratched in the skrimmage?"—for my nose was swollen to a ludicrous size.

Our loss was trifling, considering the disparity in numbers, one killed and a handful wounded. The enemy left about a dozen or more dead, and we learned their entire loss was very heavy, most of their dead and all their wounded being carried away in their retreat. Our few casualties may be attributed to the inferior character and unskilful use of the firearms, of which they had plenty. If I remember aright most of the wounds of our people were from arrows—a weapon they were very skilful with. Now-a-days the Indians with firearms of the best use them as effectively as white men.

A funny incident marked the final charge. The commanding officer's orderlies were furnished from the field musicians, and the orderly for that night was a fifer named Escudaro, a Mexican, many years in the regiment, and phenomenally

stupid about every thing but a fife. Being sent with a message to Whipple, he of course, bungled it, and Whipple (much against his will) made a move contrary to his own judgment in obedience to supposed orders. When "B" Company was scrambling up the rocky ledges, driving the long, angry waves of scowling, sullen, red devils before them, and had gained the crest, Escudaro had just returned and reported. Major Shepherd looked across, saw Whipple's move, comprehended the reason, and in the midst of the smoke, dust, and noise of yelling and firing, the writer saw Shepherd cuffing Escudaro with all his might, and heard him expending some very vigorous and uncomplimentary English. Whipple looked across and had a laugh despite his chagrin, while the whole line of "B" Company, including myself, went forward to the finish with a hearty laugh at the comical by-play amid the serious work we were at.

Ah! well! Those were jolly days, after all, and many a man, seeing this, will recall the old and long ago abandoned post, kind and genial John Webber, the Sutler, the frolics we enjoyed there out of the world, the "Tub Mill," the camps of "dug outs" when expeditions were made up, troops arriving and departing, Captain D., of the Rifles, and "G" Company's coon, and the pranks played on good-natured "Jack Lindsay," of the Rifles, and Captain (now General and Colonel Second Cavalry) Hatch's Navajoe protege "Sunday,"—a youth of three feet nothing, absolutely lawless, and whom, if in a mischievous mood, we all dreaded to meet, more than all his male relations in the field; and the final exit of the small "Sunday" simultaneously with a new outfit.

Twenty-two years, during which came the Rebellion, have wrought radical changes in the personnel of the dear old Third, but I am assured they are the same "buff sticks" as of yore. DICK.

PUNCH.

HISTORIC PUNCHES.

Punch of brandy, rum, kirsch, or wine, is only one of these liquids with sugar, slices of lemon, nutmeg and cinnamon, after which the liquor is set on fire, and so becomes an excellent preparation.

Our English neighbors have a special taste for punch, as may be inferred from the one given by Sir Edward Russell, Commander-in-Chief of the British forces, October 25, 1694.

This bowl of punch, the most extraordinary ever heard of, was prepared in the vast marble basin in the garden of his house: four barrels of brandy, eight barrels of filtered water, twenty-five thousand lemons, eighty pints of citron juice, thirteen hundred weight of sugar, five pounds of nutmeg, three hundred biscuits broken up, and finally a pipe of Malaga wine, were poured into the basin, over which a tent had been built to protect it from the rain. There was a little boat made of rosewood in which a cabin boy, elegantly dressed, belonging to the fleet, rowed upon the punch and served it out to the company, which was composed of more than six thousand persons.

This drink is generally taken hot, and for a long time a lighted bowl of punch constituted in England the last and indispensable course in every well-ordered repast. This beverage is very strengthening and very agreeable, and especially suitable after great fatigue to bring on a perspiration which may have been checked by dampness, cold or rain. Several glasses may be taken without fear of harm.

According to the dictionary of Trévoux, punch was known in 1763 under the name of good punch. It was made of a pint of brandy, a pint of lemonade and a pound of brown sugar mixed together; to which was added grated nutmeg and sea biscuit, toasted and broken into small pieces, but this beverage was hardly known except to the sailors of our merchant ships.

Here is the best receipt, according to our mind, for making French punch at the present day (1873):

Put into a bowl a bottle of old Jamaica rum and two pounds of the finest

quality of crushed sugar, set it on fire and stir the sugar with a spatula, so that it may be burnt with the rum; after the liquid is diminished by a third put into the bowl and mix with the rum and sugar four pints of souchong tea, which ought to be boiling, add the juice of eight lemons and of twelve very ripe oranges. Add finally a gill of Batavia white arrack, and serve with this punch, which ought to be very hot, to produce all of its effects, a basket of almond macaroon wafers or some other dry cakes of a fine composition.

PUNCH À LA DUPOUY.

Take a banana, cut it into thin slices, sprinkle them with powdered rock-candy, pour over them a bottle of old still Sillery, a bottle of the true *Kirschwasser* of the Black Forest, or, say of venerable Cognac brandy or old American rum (Jamaica); burn slightly and drink very warm.

The next morning, no one can say you nay if you assert that you have drunk a punch such as no one has ever drunk; such as they drink no where except in the priviliged *salons* of our true illustrators of gastronomy.

ALEXANDRE DUMAS.

YARNS FROM THE ADJUTANT'S OFFICE.

"Cac-og-raphy" muttered the Major, in the seclusion of his quarters the next morning, "hanged if I would not like to know what the fellow meant," and the Major lit his pipe and walked over to the Post Library to consult Webster's unabridged.

"Ah! *bad spelling*—well it is a gentlemanly vice anyway," said the Major, and then made his way to the Adjutant's office, where, to his great delight, a peep at the cupboard showed the key on duty.

The Major made his toddies, as he did everything else, with great deliberation. He was very particular about the water, and experimented until he had a third of a tumblerfull without speck or stain. Then he put in three lumps of sugar and waited until it was dissolved entirely out of sight, and this complete disappearance, the Major maintained, was one of the most perplexing of natural pheromena. Then he poured very slowly until the whiskey had just doubled the volume of liquid in the glass, took a sip, and added a drop more, to be sure of good measure, and sat down for a comfortable time.

"What are you doing, Quills," asked the Major.

"Wondering how long you will be in the service before you can make out a company return," replied the Adjutant.

"They suit *me*," responded the former.

"Umph," growled the busy Quills.

"When I was at Fort Spooner," continued the Major, "Pigeonholes used to be Adjutant at regimental headquarters, and I never could do any work to please him. He sent my returns back regularly, and the trouble was always with those confounded aggregates. The more I figured away at them the worse they grew, until finally I gave it up and sent a six months' supply of blanks to Pigeonholes begging him to fill them in to satisfy himself, and return them to me for signature."

The Major eyed his tumbler dubiously, and said, "It seems to me, Quills, your new glassware does not hold as much as the old set," and he went over to the cupboard.

"Well," broke in Lieutenant Buttons, "what did Mr. Pigeonholes do?"

"I never knew," replied the Major sadly, "the next thing I heard he was dead—died suddenly—brain inflammation they told me."

There was a pause. Even Quills seemed afflicted, and his hand apparently sought his handkerchief, but contented itself with an eraser.

"Why, Major Longbow," interrupted the rash Buttons, "do you really suppose those returns killed him?"

"Young man," said the Major, with great severity, turning round with the

third lump of sugar in his fingers, "this comes of your Captain's requiring you to go to reveillee. You get up too early altogether. If you keep on this way the first thing you know they will make you an Inspector-General."

BULLS AND BOTHER.

All bulls are not Irish, nor is all bother of speech devoid of sense and syntax, for in no language are ambiguities more inherent than in our own.

Thus Mother English seems color-blind when she asserts the unliteral truth that blackberries are always red when they are green.

She appears more bewildered than she really is when she tells us that a soldier wears his sword on the left side, because the left side is the right side, and the right side would be the wrong side.

A soldier of tautolagous tongue, in recounting his war perils, once said, "My comrade was shot down right on my right, while I was left on his left, unhurt."

A raw recruit in a company of rangers, who seemed rather backward in his first two or three skirmishes, showed full self-reliance in his next, and at the close of it was found firing at the last Indian from the foremost bush. "How is this, Ben?" said his Captain, "you always came behind before." "True," said Ben, "but I now come first at last, and as long as I can keep a head on me I will keep on ahead."

One fine morning, during the Middle Ages, a middle aged gentlemen stood at the foot of a gallows while a pair of witches were being hung from it. One was, as usual, old and ugly, but the other, for a wonder, young and comely. Another spectator inquired of the middle aged gentleman, "Which is the witch which bewitched you?" The other replied, "The ugly one was accused, but I think the handsome one had some hand in it."

A bold dragoon, who had just undergone an amputation, said to the operator, "Doctor, you have a safer duty than mine." "True," said the Surgeon, "but mine requires the most nerve, for cutting a friend up is a cooler business than cutting an enemy down." Hood has stolen the pith of this conceit in his ballad of Ben Battle, but I give the fact, which he converted into a metaphor. *I invented the fact long before he wrote the ballad!* P.

THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES.

PRIZE ESSAY FOR 1883.

I. The following Resolution of Council is published for the information of all concerned :

Resolved, That a prize of a Gold Medal of suitable value, together with a Certificate of Life Membership, be offered annually by "The Military Service Institution of the United States" for the best essay on a military topic of current interest ; the subject to be selected by the Executive Council and the prize awarded under the following conditions :

1. Competition to be open to all persons eligible to membership.*

2. Each competitor will send three copies of his essay in a sealed envelope to the Secretary on or before March 1st, 1884. The essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the essay, followed by a figure corresponding with the number of pages of MS., and accompany the essay by a sealed envelope bearing the *nom de plume* on the outside, and enclosing his name and address. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.

3. The prize shall be awarded upon the report of a board consisting of three suitable persons chosen by the Executive Council.

4. The successful essay to be published in the Journal of the Institution, and the essay deemed next in order of merit shall receive honorable mention, may be read before the Institution, and at the discretion of the Council, be published.

5. Essays shall not exceed twenty thousand words, or sixty pages of the size and style of the Journal (exclusive of the tables).

II. The Council on the 3d of January, 1883, resolved that the subject for the Prize Essay of 1883 should be—

The Military Necessities of the United States and the best Provisions for Meeting Them.

III. The gentlemen chosen by the Council to constitute the Board of Award for 1883 are as follows :

General WILLIAM T. SHERMAN, U. S. Army.
Major-General WILLIAM B. FRANKLIN, (late) U. S. Army.
Brevet Major-General Z. B. TOWER, U. S. Army.

THEO. F. RODENBOUGH, *Secretary.*

Governor's Island, N. Y. Harbor, *January* 3, 1883.

* All officers of the Army and Professors at the Military Academy shall be entitled to membership, *without ballot*, upon payment of the entrance fee. Ex-officers of the Regular Army of good standing and honorable record shall be eligible to full membership of the Institution *by ballot* of the Executive Council. (*Extract from By-Laws.*)

LIST OF MEMBERS WHO JOINED THE INSTITUTION DURING MARCH, 1883.†

(48.)

ALVORD, B., Jr., Lieut. 20th Inf.
ANDRUS, E. P., Lieut. 5th Cav.

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BEACH, L. H., Lieut. Engineers.
BEAUMONT, E. B., Maj. 4th Cav. L.-C.
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BUDD, O. W., Capt. 4th Cav.
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BURR, E., Lieut. Engineers.

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DALLAS, A. J., Lieut.-Col. 22d Inf.

ESKRIDGE, R. I., Capt. 23d Inf. C.

*GOODALE, G. A., Capt. 23d Inf. C.
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JOHNSON, C. P., Lieut. 4th Inf.
JONES, F. B., Lieut. 22d Inf.

KELL, W. H., Lieut. 22d Inf.
KINZIE, D. H., Capt. 5th Arty. M.

MAIZE, W. R., Capt. 20th Inf. C.
MARTIN, M. C., Lieut. 22d Inf.
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NOYES, H. E., Major 4th Cav. M.

O'CONNOR, S., Lieut. 23d Inf.

PATCH, A. M., Lieut. 4th Cav.
PERRY, D., Major 6th Cav. Col.
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ROGERS, J. S., Lieut. 20th Inf.

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SWAYNE, W., Colonel. Retired. M.-G.

TUCKER, W. F., Jr., Major Pay Dept.

*WESENDORFF, M., Capt. 1st Cav.
*WILLARD, J. H., Capt. Engineers.
WILLCOX, O. B., Col. 12th Inf. M.-G.

OMITTED FROM LIST OF MEMBERS IN NO. 12.

BAILY, C. M., Lieut. (instead of Capt.) 8th Inf.
WOOD, T. J., Brig.-Gen. Retired. M.-G.
WOODHULL, A. A., (brevet of Lt.-Col.)
DERUSSY, G. A., Col. Retired (instead of 3d Arty.)

* Life Member.

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